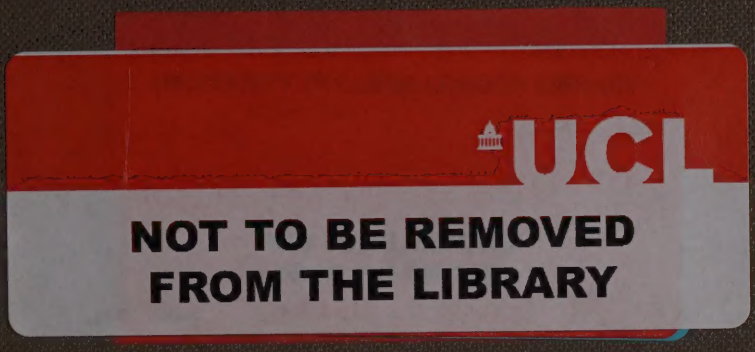
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Investigations into the Evidence for Postcranial Variation in *Bos primigenius* (**Bojanus**) in England and the Problem of its Differentiation from *Bison priscus* (**Bojanus**)

by SUE BROWNE

Introduction

The aim of this study was to investigate the evidence, provided by three bones of the postcranial skeleton, for variation in *Bos primigenius* during the Pleistocene and Early Holocene in England. As far as possible, well-provenanced skeletal material from deposits which have been pollen dated, or correlated with pollen-dated deposits nearby, was selected; material from caves was excluded because of the stratigraphic complexities and the difficulty of assigning it to a secure temporal position. The choice of the three elements of the postcranial skeleton was influenced by their potential value in differentiating between *Bos* and *Bison*, their usefulness as indicators of sexual dimorphism and the existence of comparable published measurements for later prehistoric *Bos primigenius*. The most numerous surviving elements which met these requirements were the metapodials and the calcaneum.

Because of the lack of any known Pleistocene sites where *Bos primigenius* remains are certainly unaccompanied by remains of *Bison*, it is necessary to differentiate between the bones of the two genera. This is not easy because of their similarity. In the past there has been a tendency to refer large, robust bovid long bones to *Bos primigenius* and small, gracile ones to *Bison*, although – apart from Flerov's publications on the bison from Taubach (e.g. Flerov, 1976) – little is known of the range of variation in either *Bos* or *Bison* in Europe during the Pleistocene and the very large *Bison priscus* crania from interglacial deposits at Uphall Pit, Ilford, suggest that the limbs of at least some Pleistocene bison attained a considerable size. Much of the postcranial material in museum collections is referred simply to *'Bos/Bison'* and the difficulty of accumulating a reasonable sample of reliably identified *Bos primigenius* bones led to a much more detailed consideration of the differentiation of the genera than had originally been anticipated. These investigations have drawn on the work of Schertz (1936), Reynolds (1939), Lehmann (1949), Bibikova (1958), Olsen (1960) and Stampfli (1963) concerning measurable and non-measurable distinguishing characters in the postcranial skeleton of *Bos* and *Bison*.

Material

(a) *The prehistoric samples*

Prehistoric bones were measured at the British Museum (Natural History), London; the Castle Museum, Norwich; the Institute of Geological Sciences Museum, London; the Ipswich Museum; the Sedgwick Museum, Cambridge; and the University of Cambridge Museum of Zoology.

The bones come from 13 sites in southern and eastern England – relevant details of the sites are given in Appendix 1. For the purpose of this study the interglacial Pleistocene bones have been assigned to either the 'Hoxnian' or the 'Ipswichian' interglacial although in the future a better understanding of British glacial and interglacial sequences may lead to the subdivision of these interglacials into more than one warm phase separated by one or more cold phase or phases. (If it could be shown that a size change occurred in *Bos* (or *Bison*, or both) during the Pleistocene, the remains of these animals could themselves contribute relative dating evidence for this period.) The Early Holocene bones from Flixton have been included in the Mesolithic sample.

The Hoxnian bones come from Clacton, Grays and Barnfield Pit, Swanscombe (all in Essex) and are held in the collections of the British Museum (Natural History). I saw no measurable bones from the Hoxne excavations.

The Ipswichian bones are from Barrington, Cambridge (Sedgwick Museum, University of Cambridge Museum of Zoology and Institute of Geological Sciences Museum); Beetley, Norfolk (Castle Museum, Norwich); Uphall Pit, Ilford, Essex (British Museum (Natural History)); Stutton, Suffolk (Ipswich Museum); Swanton Morley, Norfolk (Castle Museum, Norwich); and Trafalgar Square, London (British Museum (Natural History)).

The Mesolithic bones are from Flixton and Star Carr, both in Yorkshire, and Thatcham, Berkshire (British Museum (Natural History)).

All measurable bones referred to *Bos primigenius* are included. Bones referred to *'Bos/Bison'* were measured in the hope that the results of this study might lead to a more precise identification. In addition, because it was pointed out to me while I was at the Sedgwick Museum that the identification of some of the bovid material from Barrington might be considered dubious, bones referred to *Bison* in this collection were measured in case they are in fact from *Bos primiegenius*. Of course, the reverse may also apply and some of the *'Bos primigenius'* bones may be from bison. Also, because the *Bos primigenius* bones from Uphall Pit seem atypical in certain respects (this is discussed in more detail below), bones referred to *Bison priscus* from this site are included in the sample.

Finally, in order to assess the degree of confidence with which the results of the *Bos/Bison* differentiation could be regarded, bones referred to *Bison priscus* from the Devensian deposits at Willment's Pit, Isleworth, Essex, a 'pure' bison site from which no *Bos primigenius* remains have been identified, were measured. These bones are in the British Museum (Natural History).

Table 1 Epiphysial fusion data for *Bos taurus* (Silver, 1963[a]; Getty, 1975[b]) and *Bison bonasus* (Koch, 1935[c]; Empel and Roskosz, 1963[d]) metapodials and calceneum

	Bos taurus		*Bison bonasus*	
	Age (years)[a]	Age (years)[b]	Year of life[c]	Year of life[d]
Proximal metacarpal	Before birth: ossification occurs at 3–8 months	Prenatal	Prenatal	Prenatal
Proximal metatarsal	Before birth	Prenatal	Prenatal	Prenatal
Distal metacarpal	2–2½	2–2½	late 4th	3rd
Distal metatarsal	2¼–3	–	late 4th	3rd
Distal calcaneum	3–3½	3	late 4th	5th (bulls) 6th (cows)

Lists of bones measured are given in Appendix 2. Although only fused bones were measured, some of the metapodials may be from subadult animals if epiphysial union in the Pleistocene and Early Holocene *Bos* and *Bison* followed the same pattern as in modern animals: in modern cattle the metacarpal fuses distally earlier than the metatarsal and both fuse earlier than the *tuber calcis* of the calcaneum; and in modern bison the metapoldials fuse earlier than (Empel and Roskosz, 1963), or at the same time as (Koch, 1935), the calcaneum (data published by Silver (1963), Getty (1975), Koch (1935) and Empel and Roskosz (1963) are summarised in Table 1). The prehistoric samples may not, therefore, represent a totally adult population.

(b) *The comparative samples*

Comparative data on recent cattle were obtained by measuring Chillingham and Chartley cattle bones in the British Museum (Natural History) and the University of Cambridge Museum of Zoology. The sample is made up of four cows, three bulls and eight other animals from the Chillingham herd of park cattle and three bulls from the Chartley herd, also park cattle. Both herds are 'unimproved' breeds and the Chartley bulls have been included in order to incorporate some adult animals in what is otherwise a sample of rather young bulls. Unfortunately it was impossible to take all the measurements used in this study for two of the bulls because the limbs are articulated.

Table 2 Recent cattle sample; * = age and sex data from Grigson (1974)

Specimen no.	Sex	Age (years)	Source
Chillingham			
F3B 1981.985	♀	5	BM(NH)
F2 1981.989	♀	10	BM(NH)
F13C 1981.984	♀	14	BM(NH)
F9C 1981.986	♀	14	BM(NH)
H28.902	♂	*c.* 2	Museum of Zoology, Cambridge
1953.4.22.1	* Probably ♂	2–2½	BM(NH)
1953.4.22.2	* Probably ♂	2–2½	BM(NH)
1953.4.22.3	* Probably ♂	2–3	BM(NH)
1953.4.22.4	* Probably ♂	3½–4	BM(NH)
1953.4.22.5	* ♂	3½–4	BM(NH)
1953.4.22.6	* ♂	> 3½	BM(NH)
1953.4.22.9	?	< 2½	BM(NH)
(mixed:	?	2¼–3	BM(NH)
minimum of	?	2¼–3	BM(NH)
four animals)	?	2¼–3	BM(NH)
Chartley			
1924.4.28.1	♂	19	BM(NH)
H28.904	♂	*c.* 9 * (Possibly younger)	Museum of Zoology, Cambridge
0.42	♂	* Very old	BM(NH)

The ages of the Chillingham cows and two of the Chartley bulls are given in the museum catalogues although the Chartley animal **H28, 904** may be younger (Grigson, 1974: 356). The ages of the other animals have been estimated by me using Silver's (1963) epiphysial fusion data and Grant's (1975) tooth wear stages for *Bos taurus*. Details are given in Table 2 and include data published by Grigson (1974). For the purposes of the multivariate analyses, animals nos. **1953.4.22.1–4** are treated as animals of unknown sex.

Unfortunately much of this comparative material is from animals less than three years old. Because of the changes in size and shape which are likely to occur in limb bones between subadulthood and adulthood it is preferable to work with a comparative sample consisting only of adult animals, but in order to increase sample size the bones from eight subadult Chillingham cattle are included. Even so, the sample (18 animals) is still not really adequate, but it is all the material from unimproved breeds that was available in museums at the time of this study.

For the recent bison sample, Empel and Roskosz's published (1963) measurements for Polish *Bison bonasus* of known age and sex have been used (the skeletons are in the *Institut für Anatomie der Tiere* of the *Landwirtschaftlichen Hochschule* in Warsaw) and measurements were also taken of *Bison bonasus* bones in the British

Table 3 Age of epiphysial fusion in *Bison bonasus* and order in which it occurs. Summary from McDonald (1981, Table 9) with additions from original sources

Empel and Roskosz			Koch	
Order		Year	Year	Order
1	Proximal radius	2nd	Late 4th	3
2	Distal metacarpal	3rd	Late 4th	3
	Distal metatarsal	3rd	Late 4th	3
	Distal tibia	3rd	Mid 4th	2
3	Distal humerus	4th	Early 4th	1
4	Distal radius	5th ♂♂	Early 6th	6
	Distal radius	6th ♀♀		
	Distal calcaneum	5th ♂♂	Late 4th	3
	Distal calcaneum	6th ♀♀		
5	Proximal femur	6th	Mid 5th	4
	Proximal tibia	6th	Late 5th	5
	Distal femur	6th	Late 5th	5
	Proximal humerus	6th	6th	7

Museum (Natural History). The 21 bison cows and 17 bison bulls from the forests of Poland belong to the Bialowiez (Lithuania), Pszczyn and Caucasian lineages: references to publications on their ancestry can be found in Empel and Roskosz (1963). The *Bison bonasus* material in the British Museum (Natural History) comprises a bull and a cow from West Caucasus presented by St George Littledale in 1892; a Lithuanian animal of unknown sex presented by the Tsar of Russia in 1845; and a bull, a cow and two animals of unknown sex presented by the Duke of Bedford in the 1940s.

The age of the bull from Woburn Park is known and the ages of the remaining six animals have been estimated using Duffield's (1973) tooth eruption data and Empel and Roskosz's (1963) epiphysial fusion data for the long bones, although comparison with Koch's (1935) epiphysial fusion data indicates that there can be considerable variation in the age at which fusion is completed and the order in which it occurs (see Table 3). Koch's animals were from zoos or otherwise closely confined, which may partly or wholly account for the differences, but on the basis of the fusion data from either publication five of the six animals of unknown age in the British Museum (Natural History) were at least five years old at death. Bones from a subadult bison bull are included because the seven skeletons measured in this country are the only ones for which measurements of the proximal articular surfaces have been taken. Details of the recent bison sample are given in Table 4.

Because animals which live in zoos often do not achieve the stature or skeletal robusticity of wild populations it was felt desirable to consider carefully the provenance of the recent bison skeletons measured in the British Museum (Natural History). St George Littledale was a big game hunter who shot wild animals and presented the ske-

Table 4 Recent bison sample

Name/Mus. no.	Sex	Age (years)	Source
Plica	♀	2	Warsaw (Empel & Roskosz, 1963, Tables 13 and 14)
Plesnianka	♀	2	Warsaw
Plinka	♀	2	Warsaw
Plusia	♀	3	Warsaw
Pupileczka	♀	3	Warsaw
Plebanka	♀	5	Warsaw
Plama	♀	6	Warsaw
Plisa	♀	7	Warsaw
Plewa	♀	7	Warsaw
Purchawka	♀	7	Warsaw
Puszcza	♀	9	Warsaw
Plastik II	♀	11	Warsaw
Pura	♀	11	Warsaw
Poziomka	♀	12	Warsaw
Plarka	♀	12	Warsaw
Popielica	♀	12	Warsaw
Puzanka	♀	15	Warsaw
Plötze	♀	16	Warsaw
Planarie	♀	18	Warsaw
Pleinze	♀	18	Warsaw
Pliete	♀	18	Warsaw
1892.3.15.2	♀	> 5	BM(NH): St George Littledale
1947.7.16.5	♀	> 5	BM(NH): Duke of Bedford
Pulkownik	♂	2	Warsaw
Pustak	♂	4	Warsaw
Pleban	♂	5	Warsaw
Puszek	♂	5	Warsaw
Potok	♂	5	Warsaw
Plotkarz	♂	6	Warsaw
Plater	♂	7	Warsaw
Poganin	♂	8	Warsaw
Pustelnik	♂	8	Warsaw
Pokamaniec	♂	9	Warsaw
Punkt	♂	10	Warsaw
Pluszcz	♂	10	Warsaw
Puzon	♂	14	Warsaw
Pluvius II	♂	17	Warsaw
Plato	♂	17	Warsaw
Puk	♂	17	Warsaw
Plisch	♂	18	Warsaw
1946.12.17.1	♂	3	BM(NH): Duke of Bedford
1892.3.15.1	♂	> 5	BM(NH): St George Littledale
1845.10.13.2	?	> 5	BM(NH): Tsar of Russia
1948.10.29.1	?	> 2	BM(NH): Duke of Bedford
1949.6.29.1	?	> 5	BM(NH): Duke of Bedford

letons to museums, so the West Caucasian bull and cow were probably wild although the cow has a bony extosis on the back of the metatarsal shaft which is a condition more commonly seen in animals kept in captivity. (A similar bony outgrowth is present, for instance, on the metacarpal of one of the Woburn Park animals and on the calcaneum of another.) The animal presented by the Tsar of Russia probably was kept in a zoo (there are aspects of the skeleton that suggest this, and it was the custom in the 19th century for monarchs to present each other with animals for their zoos), although this animal is not particularly small for bison. The Duke of Bedford's animals were kept in Woburn Park. On balance, it was considered that the inclusion of all these animals could be justified because the Littledale specimens may be larger than average because he was collecting 'trophies' while some of the zoo specimens may be smaller than average. The bison from the Polish herds are not, strictly speaking, wild animals either.

Methods

(a) *The measurements*

A hazard of osteometry is that different people, measuring the same bone, are likely to obtain slightly different dimensions. To overcome this I have taken my own measurements of all the bones listed in Appendix 2, even if published measurements already exist, with the exception of the Polish bison bones. Standard measurements were taken using the criteria of von den Driesch (1976) and additional measurements were taken of the articular surfaces of the metacarpal and calcaneum, as described by Stampfli (1963), in an attempt to differentiate between *Bos* and *Bison*. (The measurement points are described and illustrated in Appendix 3.) Empel and Roskosz (1963) used the criteria of Duerst (1926) for their measurements of the Polish bison bones, but as von den Driesch's guide is based on Duerst's criteria their measurements are comparable with mine. Unfortunately they did not measure the articular surfaces of their bones in the way Stampfli suggests and the steps taken to overcome the problem of small comparative sample size for analyses using these measurements are discussed below.

Because of damage to the bone surface it has been necessary to estimate 63 out of a total of some 1500 measurements taken for the prehistoric sample, but I am confident these estimates are reasonably accurate; and, as it is useful to work with whole numbers in computation, all measurements have been rounded up or down to the nearest millimetre.

As a check on the long-term precision of my measurements I remeasured a *Bos primigenius* metacarpal at the British Museum (Natural History) 10 times at intervals of approximately a week. The range of variation in the recorded measurements is less than 2.8%, except for the measurements of the articular surfaces, which vary by as much as 11.4%, demonstrating the difficulty of measuring these facets accurately and, following from this, their questionable value as distinguishing characters.

(b) *The metrical analysis*

As the desired results were not obtained from univariate analysis, multivariate analyses, with the comparative samples of recent cattle and bison, were carried out using the SPSS DISCRIMINANT subprogram on the Cambridge University IBM 370/165 via the fast link through University College, London. There was a time limit on how much computation could be done, so the work was selective. Several discriminant analyses were undertaken for the metacarpal using different combinations of variables in an attempt to discover which variables discriminate best between *Bos* and *Bison.* (It would have been preferable to run a 'stepwise discriminant analysis', but unfortunately various factors prevented this.) One analysis was undertaken using the Willment's Pit *Bison priscus* as the comparative bison sample, on the assumption that the museum identifications are correct, in order to compare the Hoxnian and Ipswichian bones with a bison sample of reasonable size for which measurements of the proximal articular surfaces had been taken.

As the SPSS discriminant procedure substitutes a mean value for any missing measurements and it was seen that this introduced an undesirable degree of imprecision into the positioning of bones for which a dimension was unknown, prehistoric bones have not been plotted if any of the variables considered in the analysis have not been measured.

Because of the doubts concerning some of the museum identifications, in all the graphic presentations individual bones are represented by symbols designating their source as well as their generic attribution.

(c) *The non-metrical analysis*

The recent and Pleistocene material in the British Museum (Natural History) was examined visually in order to assess the extent to which the non-metrical distinguishing characters observed by Olsen (1960) in *Bison bison* (the nearest living relative of the European bison) and *Bos taurus,* and by Stampfli (1963) in *Bison bonasus* and *Bos taurus,* can be used to distinguish between *Bison priscus* and *Bos primigenius.*

Results and Discussion

(a) *The differentiation of* ***Bos*** *and* ***Bison***

1. *Metrical analysis.* I have referred above to the difficulty of accumulating reasonably large Pleistocene samples. Few bones from the Hoxnian have been certainly identified as *Bos primigenius* and although the Ipswichian samples are larger, there are doubts concerning the reliability of some of the identifications, particularly from Barrington. (This problem does not apply to the Mesolithic samples since there is no known occurrence of *Bison* in Britain after the end of the Last Glaciation.) Clearly, before any comparisons can be made, the crucial questions which must be considered are whether the

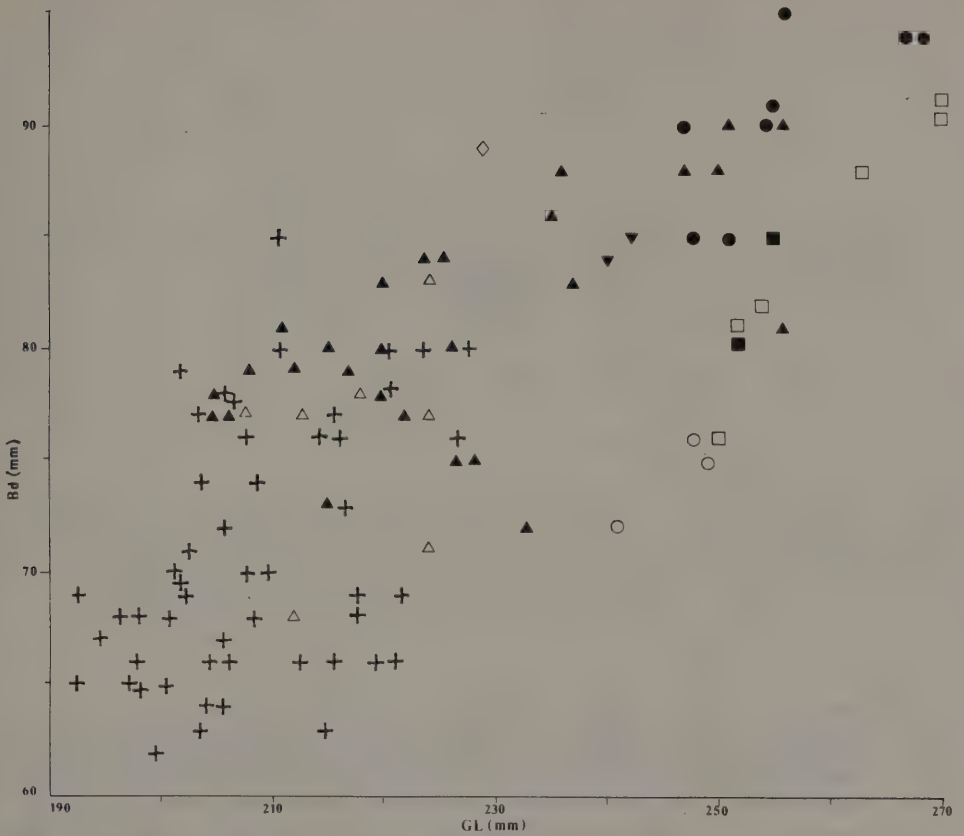

Fig. 1 Metacarpal distal breadth (Bd) plotted against greatest length (GL). Hoxnian: ■ *Bp* (*Bos primigenius*) (2); □ *xx* (*Bos/Bison*) (6). Ipswichian: ● *Bp* Uphall Pit (8); ○ *Bi* (*Bison*) Uphall Pit (3); ▲ *Bp* Barrington (27); △ *Bi/xx* Barrington (7); ◇ *xx* Beetley (1); ▼ *Bp* Trafalgar Square (2). Devensian: + *Bi* Willment's Pit (51).

Pleistocene samples of *'Bos primigenius'* contain any bison, and whether any of the 'bison' are in fact *Bos*.

The considerable overlap in size and shape between the large Devensian bison (+) and the small Barrington bones, some of which are supposed to be *Bos primigenius* (▲), is illustrated in Figs 1 and 2. As neither univariate analysis nor the use of an index (see Fig. 10) obtained a clear separation of *Bos* and *Bison* from the metapodials or the calcanea, several multivariate discriminant analyses were carried out in an attempt to separate the genera.

The extent of scatter of the Barrington bones in the discriminant analyses (Figs 3–7), and the proximity of some bones, referred to *Bos primigenius*, to the modern bison centroids (= the mean of all the variables), do suggest that some of them may

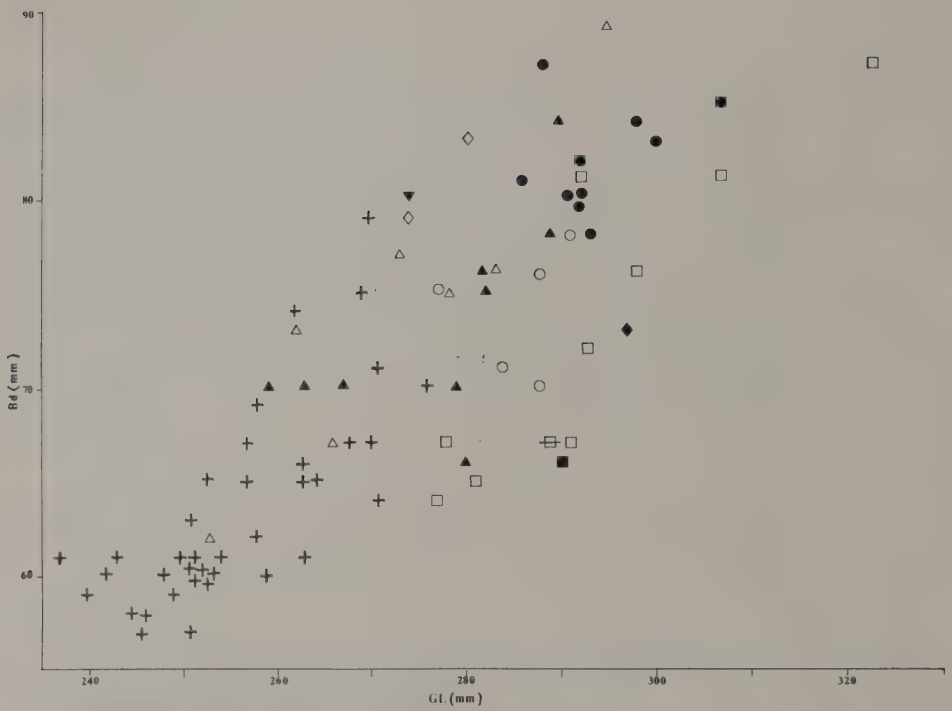

Fig. 2 Metatarsal distal breadth (Bd) plotted against greatest length (GL). Hoxnian: ▪ *Bp* (*Bos primigenius*) (1); ⊟ *Bi* (*Bison*) (1); ▫ *xx* (*Bos/Bison*) (9). Ipswichian: ● *Bp* Uphall Pit (10); ○ *Bi* Uphall Pit (5); ▲ *Bp* Barrington (9); △ *Bi* Barrington (7); ◇ *xx* Swanton Morley (2); ◆ *Bp* Stutton (1); ▼ *Bp* Trafalgar Square (1). Devensian: + *Bi* Willment's Pit (37).

in fact be from bison, especially those which fall well within the distribution of the Willment's Pit *Bison priscus*. Unfortunately, however, none of these analyses has overcome a major difficulty in differentiating absolutely between Pleistocene *Bos* and *Bison* from the postcranial bones: while modern cattle are considerably smaller than modern bison, the Pleistocene bones referred to *Bos primigenius* are on average *larger* than the bones referred to *Bison*. Nearly all the Pleistocene bones have pulled away from the comparative samples – and further away from the cattle than from the bison – partly because of their greater size and it is difficult to relate the Pleistocene material to the male and female poles of the recent animals. (In all the figures illustrating the results of the multivariate analyses, the centroids for males and females of the comparative genera are linked by a broken line.) Although the axis of sexual separation is approximately the same for modern cattle and bison, one wonders whether it was the same, too, for Pleistocene *Bos* and *Bison*. In the case of the metacarpals, in Fig. 3 the Devensian bison fall roughly into two groups along the axis of sexual separation in the recent

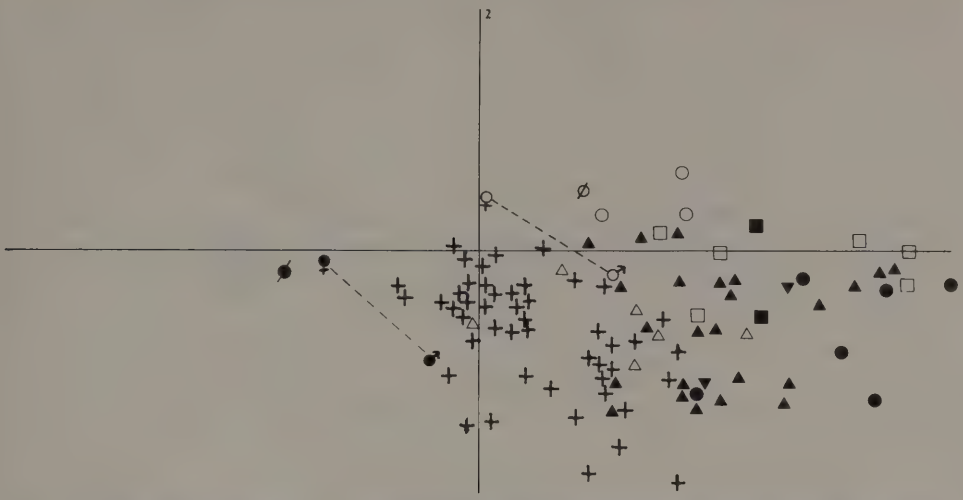

Fig. 3 Discriminant analysis of the metacarpals, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♀ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. Hoxnian: ■ *Bp* (*Bos primigenius*) (2); □ *xx* (*Bos/Bison*) (6). Ipswichian: ● *Bp* Uphall Pit (6); ○ *Bi* (*Bison*) Uphall Pit (3); ▲ *Bp* Barrington (24); △ *Bi/xx* Barrington (6); ▼ *Bp* Trafalgar Square (2). Devensian: + *Bi* Willment's Pit (48).

animals, but the Uphall Pit *Bos primigenius* (●) and *Bison* (○) are also separated along this axis; in Fig. 4, even the use of all the variables does not obtain a clear generic separation; and in Fig. 5, by far the most impressive discriminant analysis in terms of variation which seems to go well beyond sexual dimorphism, the axis of (presumably sexual) separation of the Devensian bison is not very different from the axis of separation of *Bos primigenius* and *Bison* from Uphall Pit.

Neither the metatarsals (Fig. 6) nor the calcanea (Fig. 7) separate into distinct generic groups either and one wonders to what extent there are differences between the recent animals and their Pleistocene counterparts and how these may be overcome by the use of new measurements and techniques so that a separation may be obtained using the modern species as the comparative samples. There *are* shortcomings in the comparative samples in terms of their size and composition, but the main problem is that the linear measurements (taken specifically because I wished the results of this study to be comparable with published measurements for Neolithic and Bronze Age *Bos primigenius*) do not reveal the subtle shape differences between the bones of Pleistocene *Bos* and *Bison*.

It is possible that measurements of angles and indices used as the raw data might obtain a better separation. It is also possible that there is a tendency for the narrowest part of the metatarsal shaft measured in an anterior–posterior direction (von den Driesch's 'DD') to be nearer the proximal end in bison than in aurochs and this could be

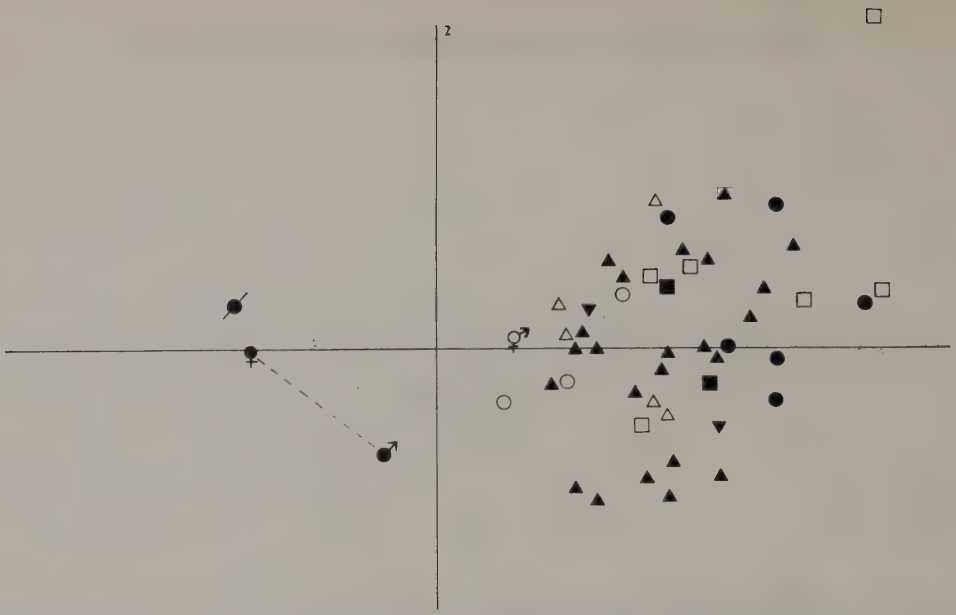

Fig. 4 Discriminant analysis of the metacarpals, variables GL-S4, axes 1 and 2, using the Devensian bison as the comparative bison sample. Open circle = Devensian bison centroid. Closed circles = modern cattle centroids, ♂ = sex unknown. Hoxnian: ■ *Bp* (*Bos primigenius*) (2); □ *xx* (*Bos/Bison*) (6). Ipswichian: ● *Bp* Uphall Pit (6); ○ *Bi* (*Bison*) Uphall Pit (3); ▲ *Bp* Barrington (23); △ *Bi/xx* Barrington (5); ▼ *Bp* Trafalgar Square (2).

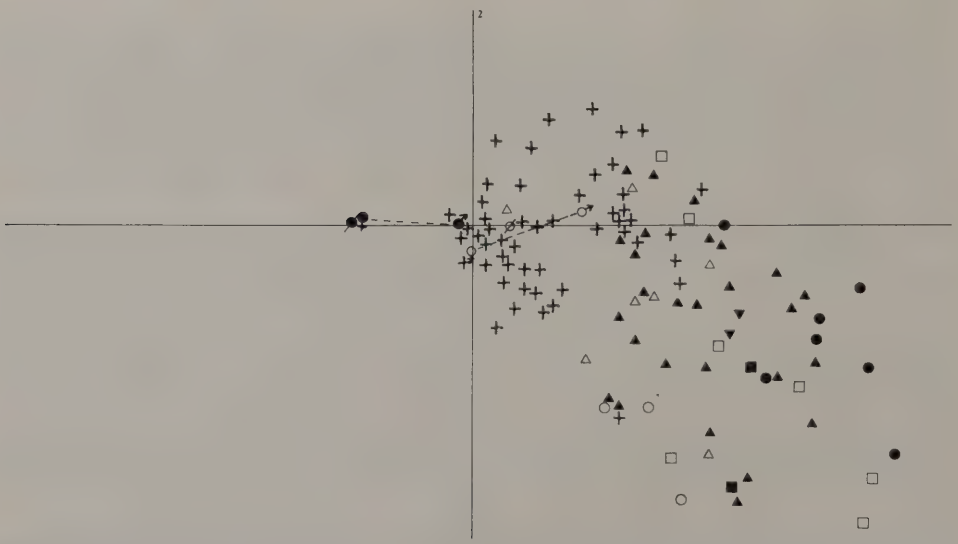

Fig. 5 Discriminant analysis of the metacarpals, variables SD-Bd, axes 1 and 2. Open circles = modern bison centroids, ♂ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. Hoxnian: ■ *Bp* (*Bos primigenius*) (2); □ *xx* (*Bos/Bison*) (7). Ipswichian: ● *Bp* Uphall Pit (7); ○ *Bi* (*Bison*) Uphall Pit (3); ▲ *Bp* Barrington (27); △ *Bi/xx* Barrington (7); ▼ *Bp* Trafalgar Square (2). Devensian: + *Bi* Willment's Pit (51).

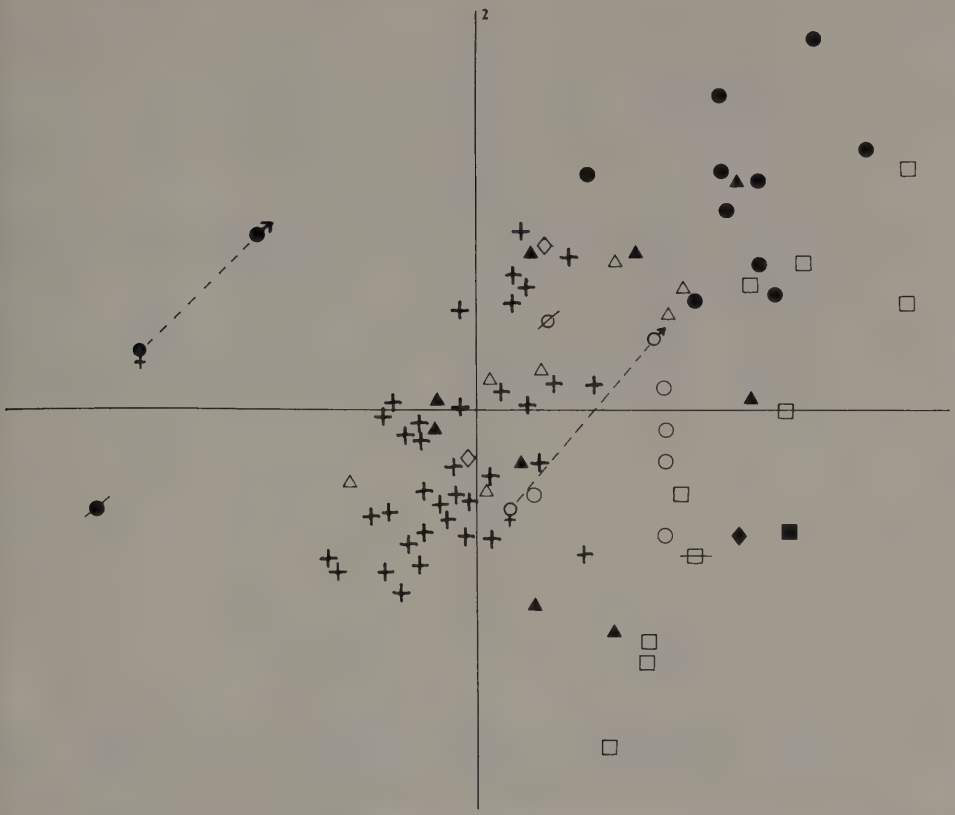

Fig. 6 Discriminant analysis of the metatarsals, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♂ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. Hoxnian: ■ *Bp* (*Bos primigenius*) (1); ⊟ *Bi* (*Bison*) (1); □ *xx* (*Bos/Bison*) (9). Ipswichian: ● *Bp* Uphall Pit (10); ○ *Bi* Uphall Pit (5); ▲ *Bp* Barrington (9); △ *Bi* Barrington (7); ◆ *Bp* Stutton (1); ◇ *xx* Swanton Morley (2). Devensian: + *Bi* Willment's Pit (36).

investigated metrically. However, it might be difficult to measure because some bison metatarsals seem prone to a distinctive broadening of the shaft in an anterior–posterior direction. Koch (1932: 565) noted this in the bison metatarsals he measured and Duffield (1973: 135) suggested that as Koch's animals were from zoos it might be a condition mainly affecting bison kept in captivity. It may be environmentally linked, because it affects many of the Devensian *Bison priscus* metatarsals from Willment's Pit, although two of the Uphall Pit bones are similarly affected. Nevertheless, if the difficulties of measurement could be overcome, shaft shape measured in this way might be a useful discriminating character for Pleistocene *Bos* and *Bison* in interglacial deposits.

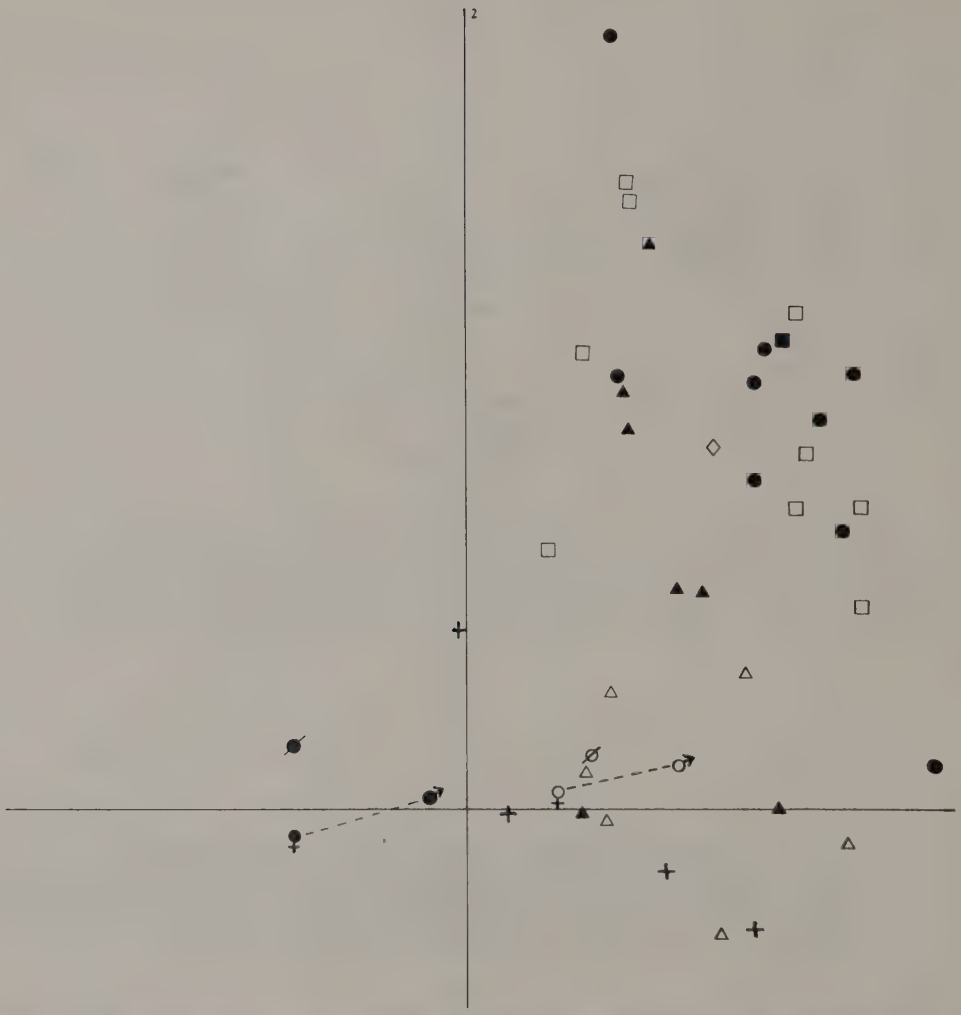

Fig. 7 Discriminant analysis of the calcanea, variables GB-S2, axes 1 and 2. Open circles = modern bison centroids (2 ♂, 2 ♀, 2 ϕ = sex unknown). Closed circles = modern cattle centroids, ϕ = sex unknown. Hoxnian: ■ *Bp* (*Bos primigenius*) (1); □ *xx* (*Bos/Bison*) (9). Ipswichian: ● *Bp* Uphall Pit (9); ▲ *Bp* Barrington (7); △ *Bi* (*Bison*) Barrington (6); ◇ *xx* Stutton (1). Devensian: + *Bi* Willment's Pit (4).

2. *Non-metrical analysis.* A visual examination of the recent and Pleistocene *Bos* and *Bison* material in the British Museum (Natural History) was carried out with reference to the non-metrical distinguishing characters described by Olsen (1960) and Stampfli (1963). These investigations concentrated on the metapodials, as the samples contain

only four Pleistocene bison calcanea. Identifications of the Pleistocene bones had to be trusted since I had no satisfactory metrical results with which to test them.

The swollen appearance of the metapodial shaft at its area of contact with the distal epiphysis is described by both authors and illustrated by Olsen (1960, Fig. 15), who found it was a distinguishing character in 18 *Bison bison* from wild herds. However, observations on material in this study suggest that while it is *not* found in cattle, this is a variable character in both recent and Pleistocene bison. Fig. 8a and b illustrates the difference between the distal metatarsal of one of the Woburn Park bison and that of the bison bull from the Caucasus which was probably a wild animal (the metatarsals of the cow from the Caucasus are similar in shape, so that the difference is not simply due to sexual dimorphism). In the Pleistocene sample there is no trace of this curved shape of the distal metapodial shaft in the *Bos primigenius* from Uphall Pit, but it is pronounced in some of the bison metapodials from the same site. It is present also, to

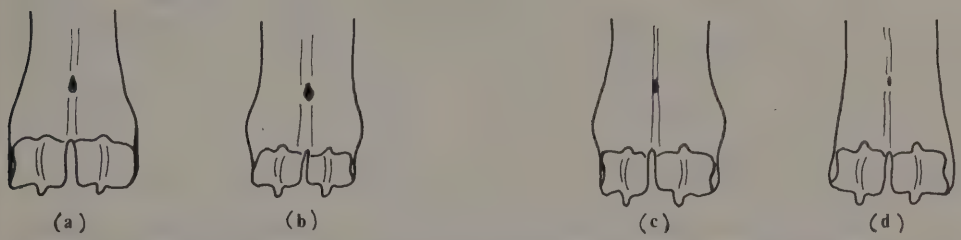

Fig. 8 (a) and (b) Recent *Bison bonasus* distal metatarsals from (a) wild (probably) and (b) captive animals. (c) and (d) *Bison priscus* distal metacarpals from Devensian deposits at Isleworth showing variation in the shape of the shaft in the area of contact with the epiphysis.

a greater or lesser extent, in many of the metapodials in the large sample of *Bison priscus* from Willment's Pit. However, the degree of curvature is not related to the robusticity of the bone and there are a few examples in which this character is totally lacking (Fig. 8c and d).

There is a considerable range of individual variation both in the morphology of the proximal articular surfaces of the metapodials (Olsen, 1960: 10; Stampfli, 1963: 141, 154) and in the angle between the proximal articular facets of the metatarsal (Olsen, 1960: 10; Stampfli, 1963: 154) in the Pleistocene material examined in the British Museum (Natural History). A brief examination of the calcanea indicated substantial variation in this element also but it was not possible to make a satisfactory comparative study of the Pleistocene material because the bison sample is so small. There is an urgent need for a much more detailed study of these non-metrical characters in the Pleistocene animals than I was able to undertake and the existence in this country of several large samples of bison from Devensian sites offers an ideal opportunity for such a study of Pleistocene bison, at least.

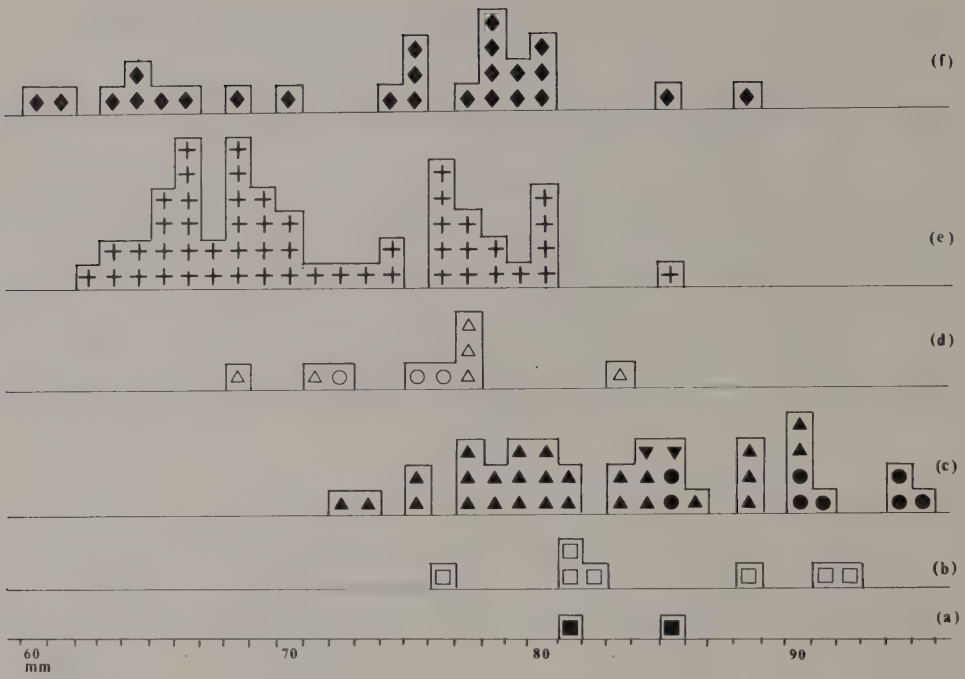

Fig. 9 Metacarpal distal breadth. (a) Hoxnian *Bos primigenius*; (b) Hoxnian *Bos/Bison*; (c) Ipswichian *Bos primigenius* (▲ Barrington, ▼ Trafalgar Square, • Uphall Pit); (d) Ipswichian *Bison* (△ Barrington, ○ Uphall Pit); (e) Devensian *Bison*; (f) Mesolithic *Bos primigenius*. Each symbol represents one bone.

(b) *Sexual dimorphism in the modern and prehistoric material*

It is clear from the histograms in Fig. 9 and the results of the univariate analyses (Figs 1 and 2) that nearly all the bones referred to *Bos primigenius* from Uphall Pit are very large by comparison with bones referred to this animal from other sites. In view of the sexual dimorphism in modern cattle and in *Bos primigenius* (Dergerbøl and Fredskild, 1970; Grigson, 1973), the size of these animals raises the question of whether they are all bulls. Although modern cattle (and bison) herds do split into single-sex groups for part of the year and individual bulls, often old animals, are sometimes segregated from the herd throughout the year, it seems puzzling that there should be only male animals in deposits which span a considerable length of time. The metapodials from Uphall Pit referred to *Bison priscus* (there are no calcanea) were therefore examined to see whether any of them could be from *Bos primigenius* cows.

While in the univariate analysis of the metacarpals (Fig. 1), tne Uphall Pit bison are clearly separated from the Uphall Pit aurochs (and from most of the Barrington bones), the distribution of the metatarsals (Fig. 2) is more ambiguous and one of them falls

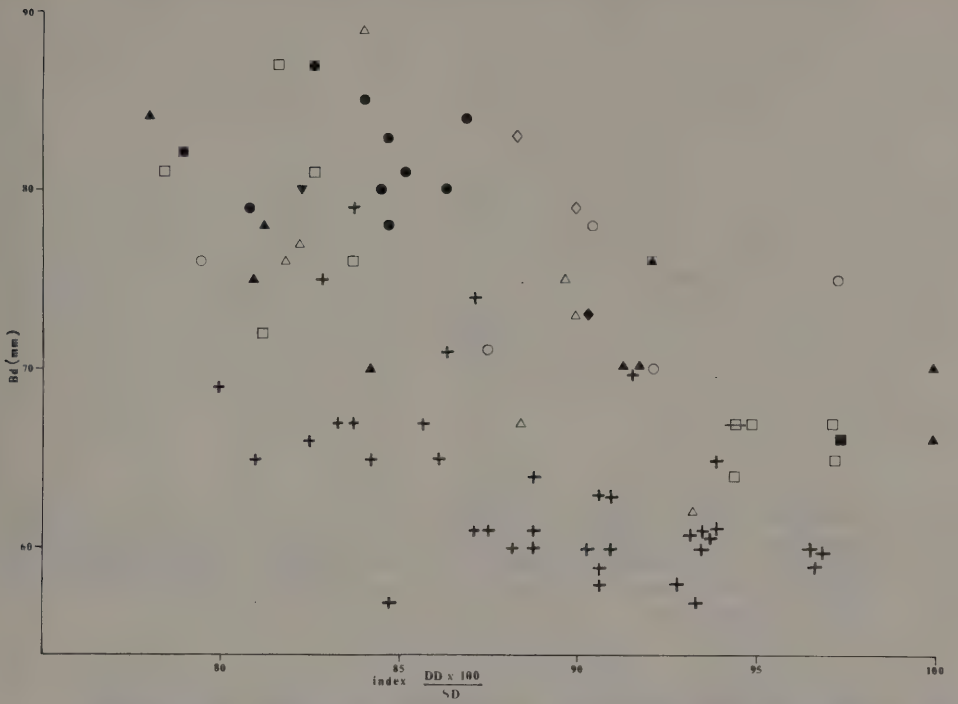

Fig. 10 Metatarsal distal breadth (Bd) plotted against index of shaft depth (DD): breadth (SD). Hoxnian: ■ *Bp* (*Bos primigenius*) (1); ⊟ *Bi* (*Bison*) (1); □ *xx* (*Bos/Bison*) (9); Ipswichian: ● *Bp* Uphall Pit (10); ○ *Bi* Uphall Pit (5); ▲ *Bp* Barrington (9); △ *Bi* Barrington (7); ◇ *xx* Swanton Morley (2); ◆ *Bp* Stutton (1); ▼ *Bp* Trafalgar Square (1). Devensian: + *Bi* Willment's Pit (37).

extremely close to a *Bos primigenius* metatarsal from the same site. In an attempt to draw out similarities or differences, the metatarsals were analysed using an index of shaft shape in relation to the distal breadth (Fig. 10). This index obtains an extremely wide scatter of the Devensian *Bison priscus* and an indication of a similar distribution of the Uphall Pit bison bones, which are presumably representative of only one species since there is no record of a second species of Pleistocene bison in Britain after the occurrence of *Bison schoetensacki* in the Cromerian and, possibly, in the early part of the Anglian glaciation (Stuart, 1982). Still, however, the Uphall Pit *Bos primigenius* bones are grouped in a comparatively tight, and separate, cluster.

In the discriminant analyses, the Uphall Pit bison metacarpals are well separated from the *Bos primigenius* from the same site (Figs 11, 12 and 13), although it is interesting that, in Figs 11 and 13 especially, this separation is on the same axis as the sexual separation in modern cattle and bison rather than in the direction of the generic separation between them.

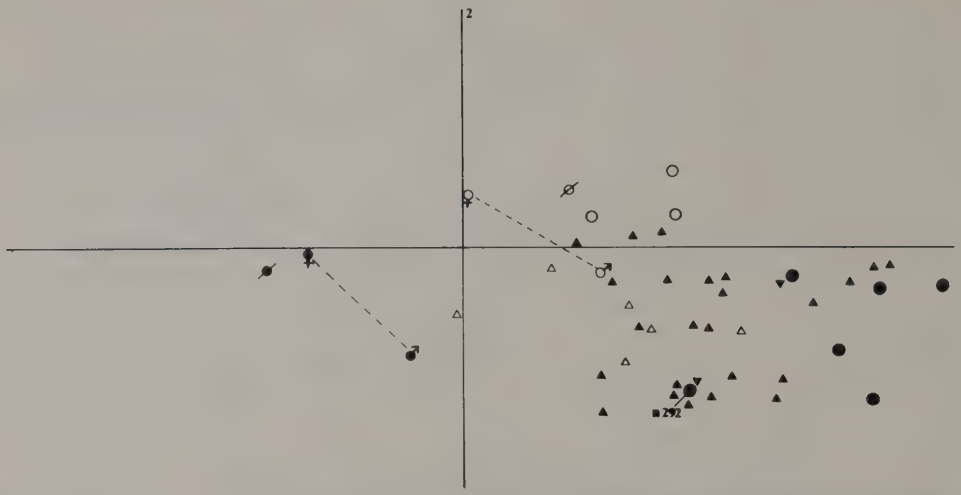

Fig. 11 Discriminant analysis of bison metacarpals from Uphall Pit, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♂ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. ○ = *Bison priscus* from Uphall Pit. ● = *Bos primigenius* from Uphall Pit. ▲ *Bos primigenius*, Barrington; △ *Bison* and *Bos/Bison*, Barrington; ▼ *Bos primigenius*, Trafalgar Square.

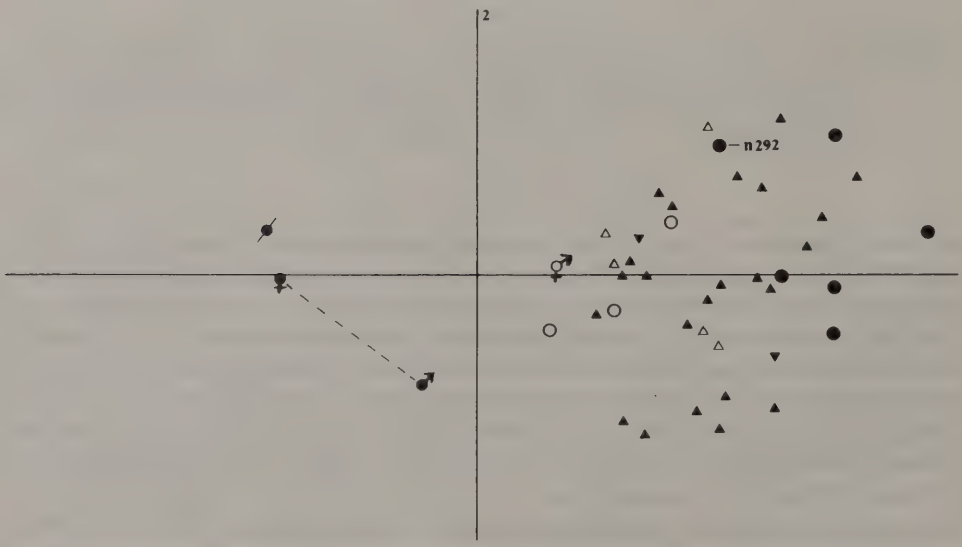

Fig. 12 Discriminant analysis of bison metacarpals from Uphall Pit, variables GL-S4, axes 1 and 2. Open circle = Devensian bison centroid. Closed circles = modern cattle centroids, ♂ = sex unknown. ○ = *Bison priscus* from Uphall Pit. ● = *Bos primigenius* from Uphall Pit. ▲ *Bos primigenius*, Barrington; △ *Bison* and *Bos/Bison*, Barrington; ▼ *Bos primigenius*, Trafalgar Square.

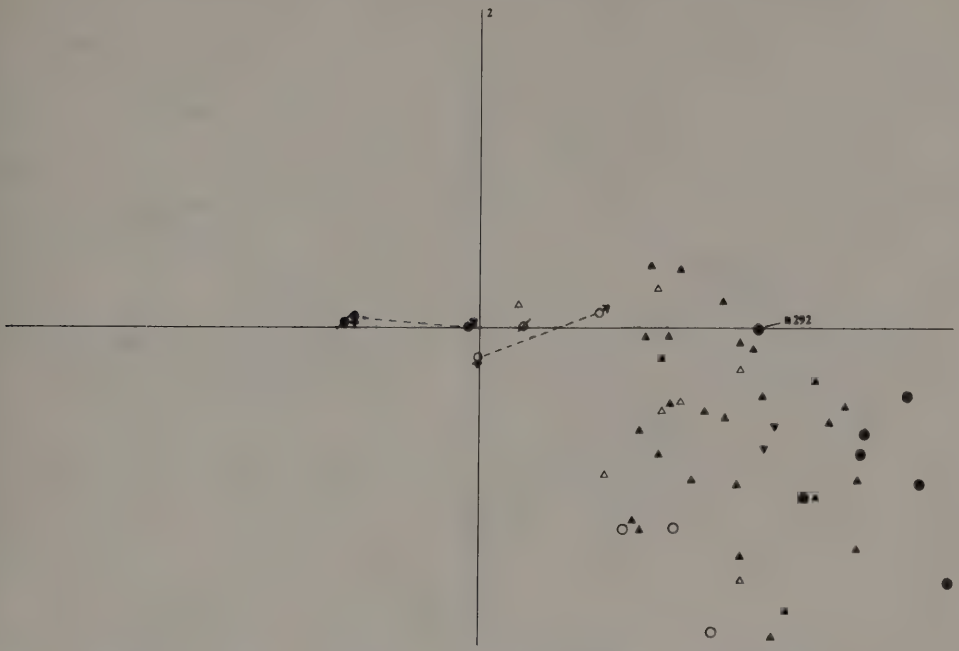

Fig. 13 Discriminant analysis of bison metacarpals from Uphall Pit, variables SD-Bd, axes 1 and 2. Open cirlces = modern bison centroids, ♀ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. ○ = *Bison priscus* from Uphall Pit. ● = *Bos primigenius* from Uphall Pit. ▲ *Bos primigenius*, Barrington; △ *Bison* and *Bos/Bison*, Barrington; ▼ *Bos primigenius*, Trafalgar Square.

Similarly, the Uphall Pit bison metatarsals pull away from the aurochs more on the axis of sexual separation of the recent animals than in the direction of their generic separation (Fig. 14a), and yet when considered in relation to the range of individual variation in recent bison cows and bulls (Fig. 14b), they fall within this range.

In view of the way the Uphall Pit bison metapodials are separated from the associated *Bos primigenius* in all the discriminant analyses, it cannot be demonstrated convincingly that any of these bones are *not* from bison. On the other hand, is there any evidence from the multivariate analyses for female animals among the *Bos primigenius* bones? With such a small sample it is difficult to assess the extent to which there may be evidence for sexual dimorphism, and particularly since it is so difficult to relate the Pleistocene material to the axes of sexual dimorphism of the recent animals.

The Chillingham cattle are perhaps not the best animals to use for comparative purposes because, although they are a biologically distinct, unimproved breed, the degree of sexual dimorphism is low compared to other breeds (see Figs 14b and 15, and especially the positioning of the (probable) young bulls nos. **1953.4.22.1–4**) although this

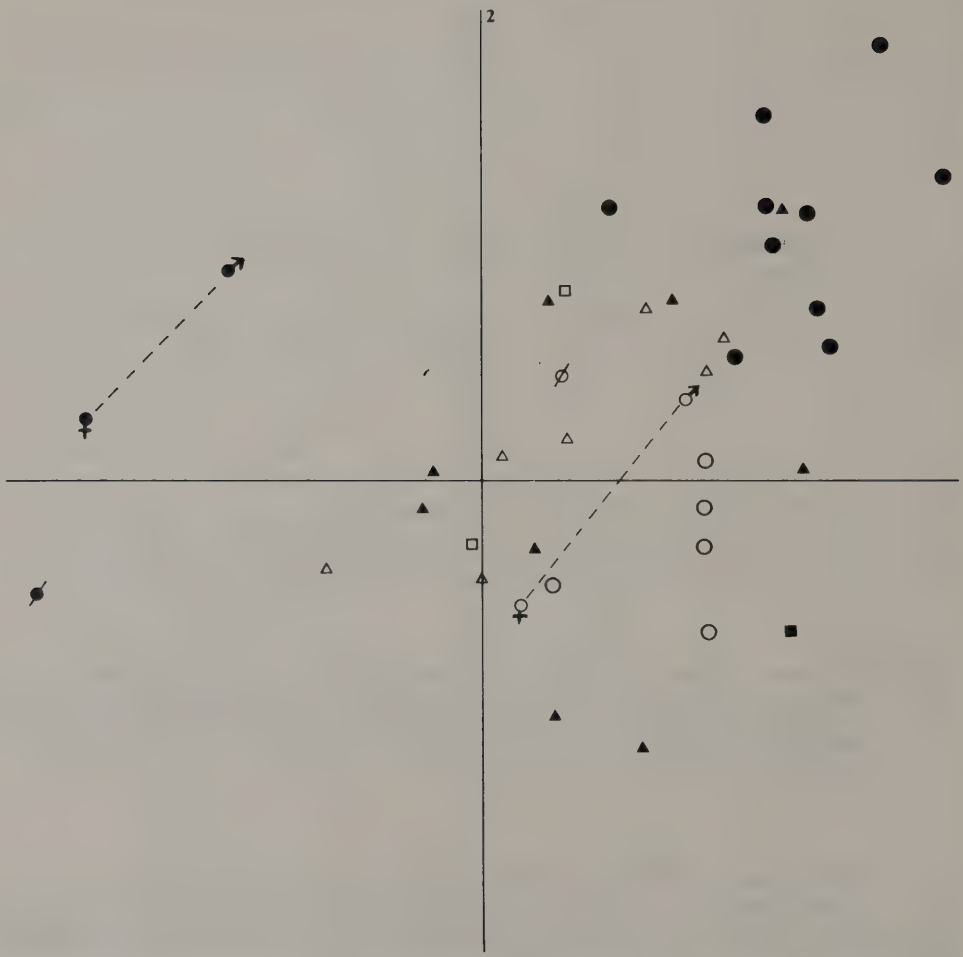

Fig. 14a Discriminant analysis of bison metatarsals from Uphall Pit, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♂ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. ○ = *Bison priscus* from Uphall Pit. ● = *Bos primigenius* from Uphall Pit. ▲ *Bos primigenius,* Barrington; △ *Bison,* Barrington; ■ *Bos primigenius,* Stutton; □ *Bos Bison,* Swanton Morley.

has been balanced to some extent by the inclusion of the three Chartley bulls. The mean values substituted for missing dimensions during computation has a considerable effect on the positioning of bones – especially the metatarsals – for which there is at least one unknown dimension and the specimen numbers of these bones have been underlined with a broken line in Figs 14b and 15.

In the discriminant analysis in which the Devensian bison are the comparative sample so that the measurements of the articular surfaces of the metacarpals may be

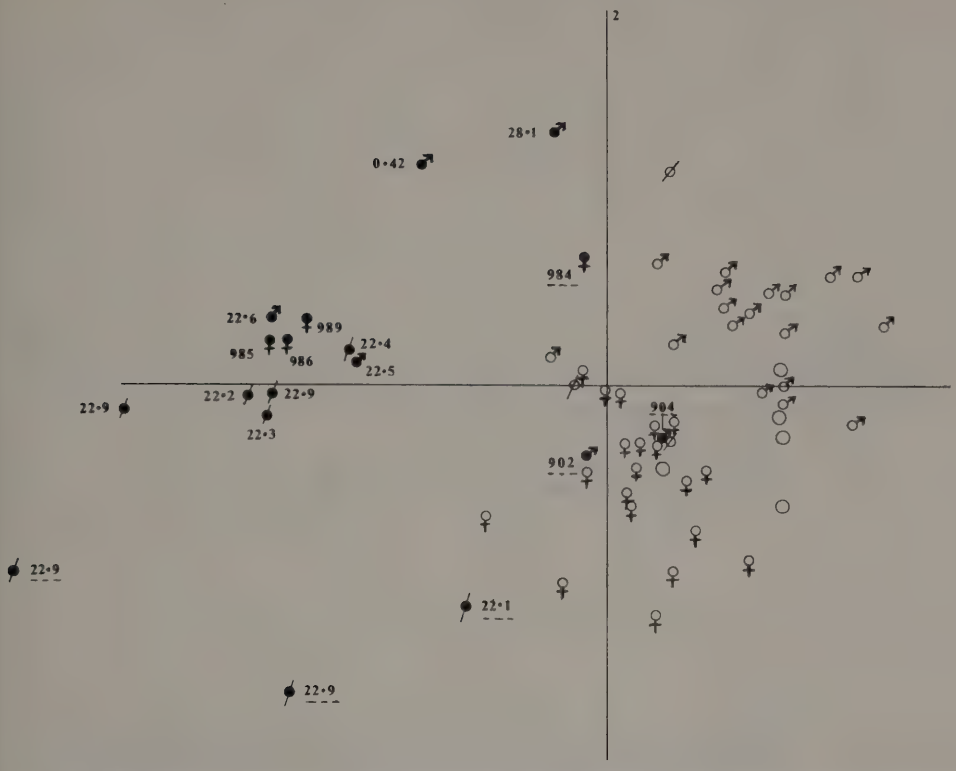

Fig. 14b Discriminant analysis of bison metatarsals from Uphall Pit and recent animals, variables GL-Bd, axes 1 and 2. Open circles = *Bison bonasus*, ♀ = sex unknown. Closed circles = Chillingham and Chartley cattle, ♂ = sex unknown. ○ = *Bison priscus* from Uphall Pit.

considered in the analysis (Fig. 12), bone no. n292, at least, could be from a cow *if* the axis of sexual separation is the same for *Bos primigenius* as for the centroids of the sexes in modern cattle. However, it is very difficult to measure the articular surfaces accurately and this suggestion is supported only to a limited extent by the positioning of this bone in the other two discriminant analyses of the metacarpals (Figs 11 and 13). The fact that the *Bos primigenius* from Uphall Pit seems atypical in some respects when compared with the rest of the Pleistocene sample referred to *Bos primigenius* emphasises the need for larger samples from a much wider area in any future study of variation in this animal.

(c) *Size change in Bos primigenius during the Pleistocene and the Early Holocene*

The original aim of this study was to investigate the evidence for variation in *Bos primigenius*. The histograms of the distal breadths of the prehistoric metacarpals

Fig. 15 Discriminant analysis of recent cattle metacarples, variables GL-Bd, axes 1 and 2. In this figure and Fig. 14b, specimen numbers underlined with a broken line indicate bones for which there is at least one unknown dimension.

(Fig. 9) appear to indicate that *Bos primigenius* was smaller in the Mesolithic than in the Pleistocene, even allowing for some incorrect identifications. However, one factor which may have particular significance for the comparison of the Ipswichian and Mesolithic bones is the possibility that small aurochs bones were mistaken for those of recent

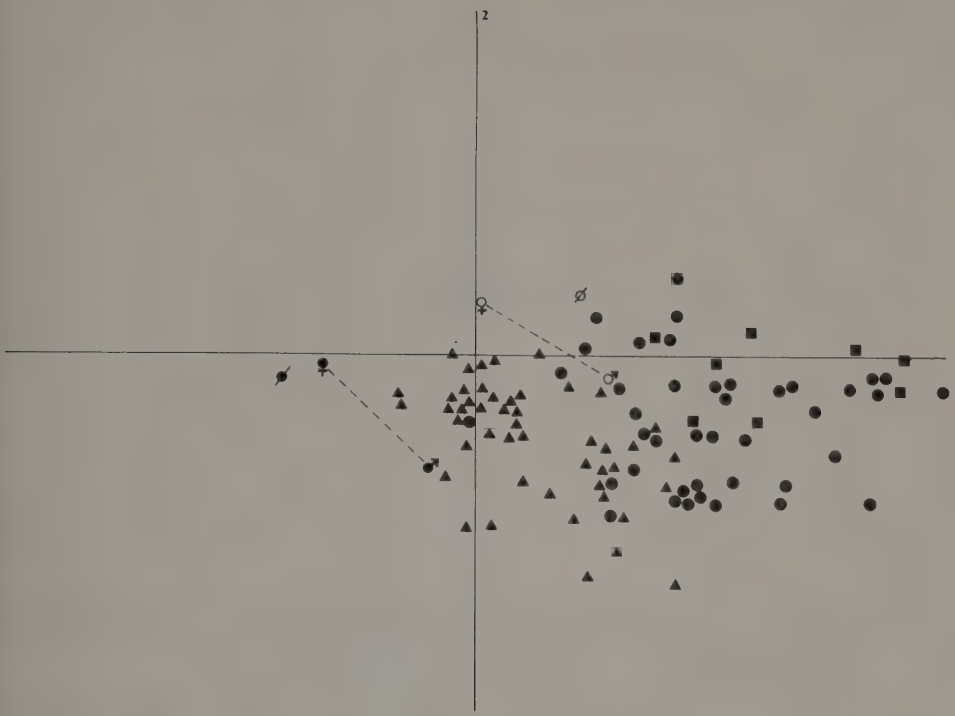

Fig. 16 Discriminant analysis of the Pleistocene bovid metacarpals, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♀ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. ■ = Hoxnian; ● = Ipswichian; ▲ = Devensian.

cattle and not collected from the Ipswichian deposits (none of which was an archaeological site). Another is the possibility that an additional bias is being introduced because the Mesolithic bones are from human occupation sites and the Ipswichian bones are not. Nevertheless, there is an indication of a bimodal distribution of the Mesolithic bones with the large (? male) animals falling within the size range of the smaller end of the Ipswichian distribution, which certainly does suggest a size difference between the two populations.

Taken together, the Hoxnian (■) and Ipswichian (●) bovids tend to be larger than the Devensian bison (▲), as revealed by the separation along axis 1 in Fig. 16, and there are shape differences too (Fig. 17), which may well be more related to the occurrence of *Bos* than *Bison* since the majority of the Ipswichian specimens are probably *Bos*. The metatarsals (Fig. 18) provide possible evidence for generic separation as well as temporal variation if the 'width' of the scatter is seen as reflecting microevolutionary change plus generic differentiation: the Devensian bison form a compact group except for one outlier; the wide scatter of Ipswichian bones represents *Bos* and (probably) *Bison* and the

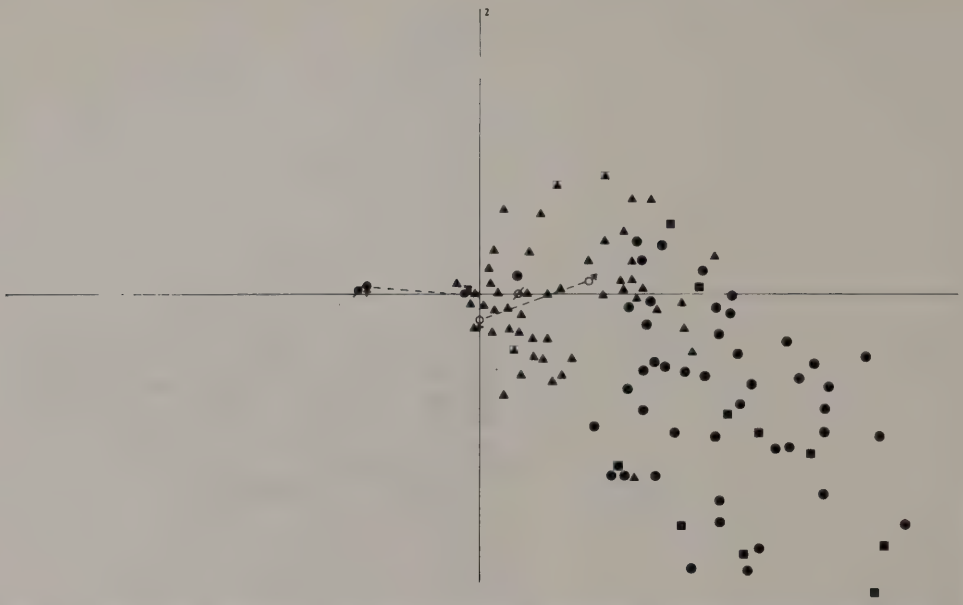

Fig. 17 Discriminant analysis of the Pleistocene bovid metacarpals, variables SD-Bd, axes 1 and 2. Open circles = modern bison centroids, ♀ = sex unknown. Closed circles = modern cattle centroids, ♀ = sex unknown. ■ = Hoxnian; ● = Ipswichian; ▲ = Devensian.

narrow distribution of the Hoxnian bones along the axis of sexual dimorphism in modern animals may indicate that they are *Bos* only – or that the hind limbs of *Bos* and *Bison* were extremely alike during the Hoxnian. It would be interesting to see how much this distribution was altered by a larger Hoxnian sample.

Considering the Uphall Pit bison in relation to the Devensian bison, most of the Uphall Pit bones fall slightly outside the distribution of the Devensian bison except when the metatarsal index is used (see Fig. 10). The distal breadths of the three metacarpals (see Fig. 9) do not demonstrate a difference in absolute size, but Coope and Angus (1975: 366) describe the Willment's Pit *Bison priscus* as 'the rather *small* form that is well known from the Last Glaciation' (my italics) and as this is the opposite of what one would expect of animals living in glacial conditions (one would expect them to be large, conforming to Bergmann's Law), it may be an indication of a trend towards a size reduction in bison before the beginning of the Devensian. It is possible that the Uphall Pit deposits are earlier in date than the Ipswichian, which could well be the reason for the differences between the *Bos primigenius* from Uphall Pit and from the other Ipswichian sites. Furthermore, if the Uphall Pit *Bos primigenius* bones are considered as a separate and earlier sample, their position at the upper end of the size range of Ipswichian bones in Fig. 9 is exactly what one would expect if, as well as a reduction in the size of bison, a parallel size reduction was occurring in *Bos primigenius* during the Pleistocene.

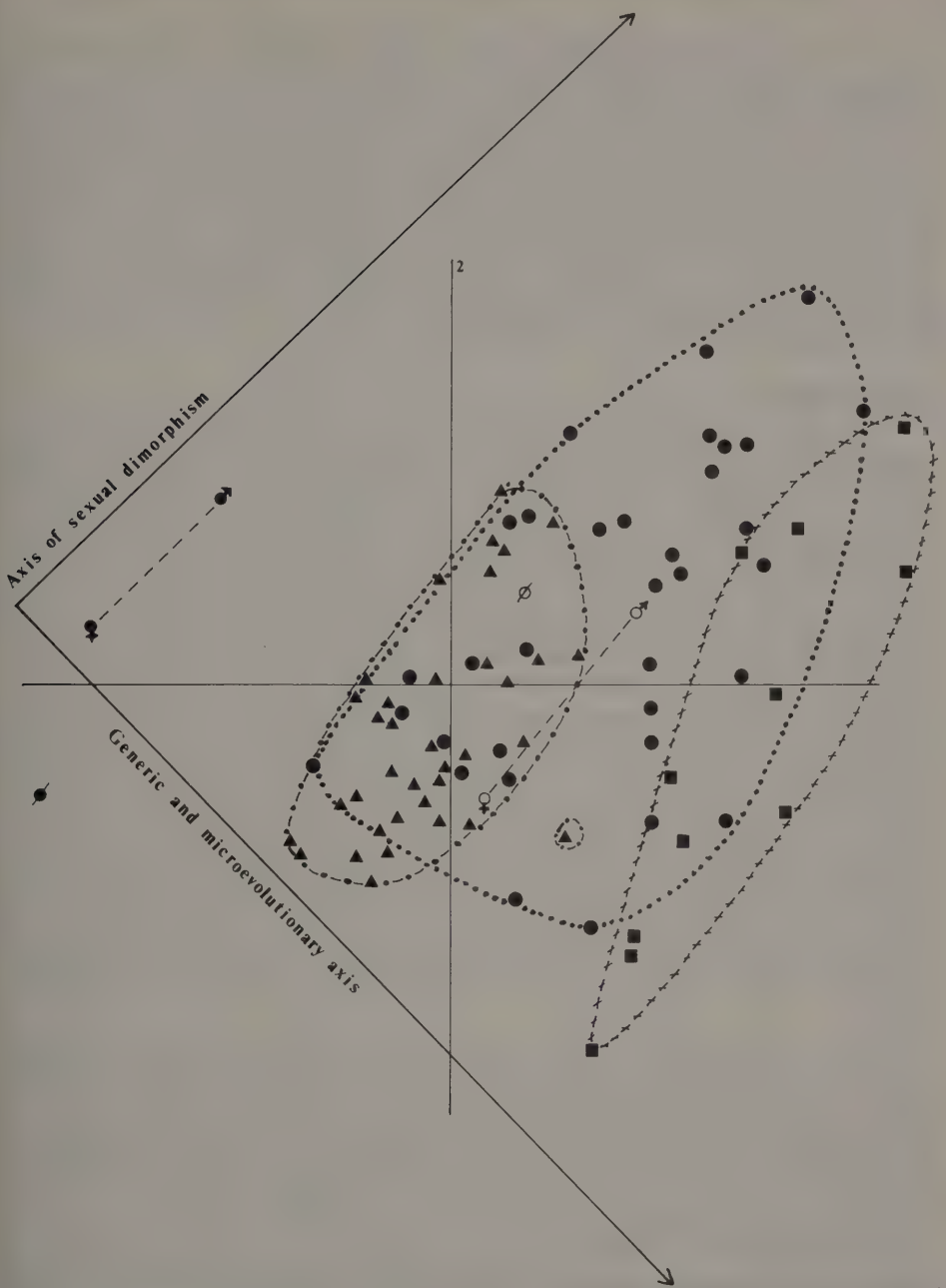

Fig. 18 Discriminant analysis of the Pleistocene bovid metatarsals, variables GL-Bd, axes 1 and 2. Open circles = modern bison centroids, ♀ = sex unknown. Closed circles = modern cattle centroids, ♂ = sex unknown. ■ = Hoxnian; ● = Ipswichian; ▲ = Devensian.

The obvious question this study raises is why a satisfactory metrical separation of *Bos* and *Bison* has not been obtained. Perhaps the dimensions measured are not the best ones for differentiating between *Bos* and *Bison*; the analytical techniques may be inadequate; or *Bos* and *Bison* may have been more alike, metrically, during the Pleistocene than they are today. There is a considerable range of individual variation in the non-metrical characters and their potential for discriminating between Pleistocene *Bos* and *Bison* needs to be assessed in further studies. Nevertheless, some interesting information has been obtained. In evaluating species variation, sexual dimorphism has had to be taken into account and there may be other variation, revealed by the metrical analyses, which has taxonomic or microevolutionary significance.

Acknowledgments

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Abstract

The evidence for postcranial variation in *Bos primigenius* in England is assessed in relation to the difficulty of differentiating between the Pleistocene remains of this animal and *Bison*. Bones from selected Hoxnian and Ipswichian sites are compared metrically with samples of recent European cattle and bison and with a large sample of *Bison priscus* from Devensian deposits. The non-metrical distinguishing characters noted by other workers in Holocene *Bos* and *Bison* are analysed with reference to the Pleistocene species. Evidence for sexual dimorphism in the Pleistocene genera is investigated. Although the problem of differentiation remains, the results of the metrical analyses reveal variation in the Pleistocene animals which may have taxonomic or microevolutionary significance.

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Appendix 1. The Sites

(1) *Hoxnian*

CLACTON-ON-SEA, Essex

The animal remains from bed *y*, in the lower part of the freshwater beds of the Clacton channel were described by Warren in 1923. Some were *in situ* on the foreshore and it is probable that all the bovid bones examined in this study were from the same bed. Pike and Godwin's (1953) pollen analyses through approximately 5.5 m of deposits in the Clacton channel place the upper part of the freshwater beds in the second half of the Hoxnian interglacial (zone Ho III) and the pollen assemblage obtained from sediment from the crevices of a rhinoceros tooth from bed *y* is regarded by them as a little earlier than the base of the long pollen series. Pollen evidence from a second borehole suggests that bed *y* extends back in age at least to subzone Ho IIb (Turner and Kerney, 1971).

GRAYS, Essex

Some of the Grays deposits are probably Ipswichian (Carreck, 1976) but the W. Ball Collection of the 1830s and 1840s and the J. Brown Collection of the 1850s (both unpublished and from a patch of 'brickearth' now worked out) form a coherent group of warm interglacial forest animals of Hoxnian character, including Merck's rhinoceros (abundant), narrow-nosed rhinoceros (rare), macaque, fallow deer and red deer. Measurable bovid bones from these collections have therefore been included in order to increase the Hoxnian sample size.

SWANSCOMBE (Barnfield Pit), Essex

The mammalian remains from the 1955–60 (Wymer, 1964) and earlier excavations at Swanscombe have been described by Sutcliffe (1964), and it is bones from these excavations, from the Lower and Middle Gravels at Barnfield Pit, which have been measured for this study. No bones from the recent (Waechter, 1968–71) excavations in the Lower Loam have been referred to *Bos primigenius* (Currant, pers. comm.). On the molluscan evidence, Kerney (1971) places the Lower Gravel, the Lower Loam and the base of the Lower Middle Gravel within zones Ho II and III, and this date is supported by the pollen profile of the Lower Gravel and Lower Loam (Hubbard, 1977). The pollen evidence is at variance with the molluscan evidence in the remainder of the Middle Gravels, which may be later in date than the Hoxnian but on the evidence of the mammals must be earlier than the Ipswichian.

(2) *Ipswichian*

BARRINGTON, Cambridge

The Barrington Beds occur in a river terrace about 6 m above the present floodplain of the river Cam, or Rhee. The bovid bones come from pits dug at the end of last century during the extraction of phosphate nodules ('coprolites') from the Cambridge greensand. Early descriptions of the stratigraphy and vertebrate remains were published by Fisher (1879) and Hughes (1911). Recent pollen analyses from sediment adhering to a rhinoceros mandible, a hippopotamus incisor and a hippopotanus canine indicate an Ipswichian subzone IIb age for the deposits in which the bovid remains were found (Gibbard and Stuart, 1975).

BEETLEY, Norfolk

In 1964 gravel workings near East Dereham exposed organic deposits and mammalian remains including *Hippopotamus amphibius, Palaeoloxodon antiquus, Megaloceros, Rhinoceros hemitoechus, Cervus elaphus* and 'a species of bison' (McWilliams, 1972: 4) which Stuart (1976, Table 2) describes as *Bos* or *Bison'*. The pollen assemblage from sediment taken from a *Hippopotamus* bone from a drawn section indicates an early Ipswichian subzone IIb age (Phillips, 1976). The exact provenance of the other bones is unknown.

ILFORD (Uphall Pit), Essex

Over 300 *Bos primigenius* bones are listed in Sir Antonio Brady's catalogue of mammalian remains from Uphall Pit, Ilford, published privately in 1874. The bones were collected during 'brick-earth' extraction from a terrace of the river Roding 10 m OD during the second half of the 19th century. In 1959, organic deposits were exposed beneath the brickearth at a site next to Seven Kings Station, Ilford, and the pollen assemblage obtained from them and from the lower part of the brick-earth is assigned by West *et al.* (1964) to the end of the Wolstonian and the first half of the Ipswichian interglacial (up to subzone Ip IIb).

STUTTON, Suffolk

The animal remains from the Stutton 'brickearth' were described by Spencer (1953) and were collected during the past century while the brickearth was being worked commercially, and from foreshore exposures, although there are no details as to their exact provenance. Spencer (1953: 27) attributed a 'Great Interglacial' age to them but pollen and molluscan analyses by Sparks and West (1963) from samples taken through 2.9 m of the brickearth indicate that the deposits near the base of the fossilferous section belong to the second half of the Ipswichian interglacial (zone Ip III) and on these grounds the bovid bones are included in the Ipswichian sample.

SWANTON MORLEY, Norfolk

The interglacial deposits discovered during gravel working in 1969 contained animal remains which were described by McWilliams in 1972. Microscopic and macroscopic plant remains from blocks of organic material and from sediments adhering to the vertebrate remains indicated an Ipswichian date for the deposits and for a *Palaeoloxodon antiquus* molar (subzone Ip IIb) and *Hippopotamus amphibius* and *Bos primigenius* long bones (zone Ip III) (Phillips, 1976). This dating was confirmed by recent examination of *in situ* plant and vertebrate remains at a new pit in the same locality (Coxon *et al.*, 1980). Among these vertebrate remains (but not included in this study) were *Bos primigenius* bones dated to Ipswichian subzone IIa.

TRAFALGAR SQUARE, London

The animal remains from fossilferous gravels discovered during building operations at Trafalgar Square were described by Sutcliffe and Kowalski in 1976. The pollen assemblage from associated organic deposits indicates an Ipswichian subzone IIb age (Franks, 1960).

(3) *Mesolithic*

FLIXTON, Yorkshire
8,463 ± 210 bc (Q-66)

Reports on the excavations at these sites and a brief description of the animal bones were published by Moore in 1950 and 1954.

STAR CARR, Yorkshire
7607 ± 210 bc (Q-14) and 7358 ± 350 bc (C-353)

The animal remains were described by Fraser and King (1954) and measurable bones held by the British Museum (Natural History) have been included in this study. Some re-identifications have been made by Adrian Lister of the University of Cambridge Museum of Zoology (unpublished, but details are held by the British Museum (Natural History)), and where these apply to *Bos primigenius* they have been taken into account.

THATCHAM, Berkshire
7890 ± 160 bc (Q-651) and 7540 ± 160 bc (Q-652)

The animal bones, described by King (1962), are from the 1961 excavations (Wymer, 1962). The stratigraphy of sites III and V is described by Churchill (1962).

(4) *Devensian bison*

ISLEWORTH (Willment's Pit), Essex

A gravel extraction site, worked during the 1950s and early 1960s, from which animal remains including mammoth, woolly rhinoceros, reindeer and *Bison priscus* were recovered (Coope and Angus, 1975). A ^{14}C date of 41,190 ± 1,400 bc (Birm-319) was obtained from coarse plant material in the fossiliferous deposits, which contained a temperate insect assemblage of the Upton Warren Interstadial (Coope, 1977).

Appendix 2. Lists of Bones Measured (Key is at end of lists)

1. Metacarpals

1	n163 45595	bp	2	267	96	58	39	94	51	55	45	41
2	n166 45598	bp	1	255	90	−1	34	90	50	52	44	38
3	n291 45601	bp	1	268	−1	56	36	94	−1	−1	−1	−1
4	n168 45600	bp	1	251	87	53	35	85	44	49	41	36
5	n165 45597	bp	1	247	93	55	35	90	47	53	46	40
6	n167 45599	bp	2	255	89	54	34	91	45	52	44	37
7	n292 45602	bp	2	248	81	52	31	85	41	48	35	33
8	n164 45596	bp	1	256	91	56	34	95	45	53	37	37
9	bar d28755	bp	1	225	81	51	32	84	46	49	38	36
10	bar d28757	bp	2	208	−1	47	34	79	42	46	−1	−1
11	bar d30955	bi	2	223	75	49	33	−1	40	47	35	28
12	bar d30956	bi	2	224	85	52	32	83	41	48	40	35
13	bar d30957	bi	2	224	75	44	29	77	40	44	35	31
14	bar d30959	bi	2	213	79	50	32	77	45	47	38	33
15	bar d30960	bi	1	207	−1	48	30	77	40	47	−1	−1
16	bar d28750	bp	2	224	84	53	32	84	42	48	37	34
17	bar d28749	bp	2	237	81	53	32	83	45	46	38	32
18	bar d28748	bp	2	250	89	53	36	88	44	54	−1	−1
19	bar d28747	bp	2	227	79	46	31	75	42	48	41	32
20	bar d28746	bp	2	222	80	48	31	77	40	46	35	35
21	bar d28743	bp	2	215	84	52	30	80	45	50	40	34
22	bar d28742	bp	2	220	−1	49	36	80	−1	−1	−1	−1
23	bar d31916	bp	2	211	79	50	32	81	41	48	35	31
24	bar d31915	bp	1	235	88	53	35	86	46	51	39	37
25	bar d31919	bp	1	234	76	42	30	−1	38	43	34	30
26	bar d31918	bp	1	212	72	48	30	−1	36	43	24	27
27	bar d31925	bp	2	220	82	53	31	83	41	48	42	36
28	bar d31924	bp	1	233	71	41	30	72	35	41	34	28
29	bar d31923	bp	1	247	88	58	36	88	49	48	45	36
30	bar d31926	bp	2	206	74	45	28	77	42	46	34	30
31	bar d31927	bp	2	215	73	39	29	73	38	42	35	30
32	bar d31928	bp	2	227	74	43	29	75	41	44	36	31
33	bar d28744	bp	1	212	80	50	35	79	40	46	36	35
34	bar d28745	bp	1	255	91	52	34	90	48	55	44	41
35	bar d28751	bp	1	220	79	49	30	78	44	48	37	35

36	bar d29568	bp	1	217	83	50	32	79	40	44	37	32
37	bar x15918	bp	1	205	−1	49	33	77	39	45	−1	−1
38	bar d28756	bp	1	205	77	50	29	78	39	44	39	31
39	bar x17644	bp	2	256	82	52	37	81	44	45	38	32
40	bar x17645	bp	2	251	94	55	34	90	42	48	41	36
41	bar x17646	bp	2	236	87	56	34	88	46	52	37	35
42	bar x17647	bp	2	226	83	51	34	80	39	49	32	34
43	bar x17649	bp	2	249	86	−1	−1	−1	46	48	40	36
44	bar 85.819	bi	2	212	66	40	25	68	39	43	−1	−1
45	bar 85.818	bi	1	224	70	41	29	71	38	42	35	30
46	bar 85.822	xx	2	218	79	51	30	78	40	49	32	33
47	383.964/5	xx	1	229	−1	−1	−1	89	−1	−1	−1	−1
48	m12 45403	bi	1	248	76	43	33	76	41	43	35	31
49	m13 45404	bi	1	249	78	43	31	75	41	43	36	31
50	m14 45405	bi	1	241	71	39	29	72	41	40	35	28
51	ts IX.4/6	bp	1	242	86	50	32	85	45	51	41	34
52	ts 957.I.4	bp	1	240	88	52	33	−1	46	50	42	38
53	ts nzh	bp	1	240	78	49	32	84	41	42	39	34
54	ts nzh	bp	1	255	85	54	34	−1	43	53	38	32
55	cl 39503	xx	1	−1	−1	54	35	81	−1	−1	−1	−1
56	cl 15520	xx	2	254	88	55	31	81	48	51	40	35
57	sw basalgr	xx	1	263	91	53	35	88	45	54	39	36
58	cl 27981	bp	1	255	85	53	34	85	43	48	41	34
59	swumgE1038	xx	1	252	84	54	32	82	43	50	38	35
60	sw mg mar	bp	2	252	80	44	33	81	44	46	38	34
61	sw bg ken	xx	1	250	75	43	32	76	41	45	38	32
62	gr 18763	xx	1	270	90	51	37	91	53	56	46	39
63	gr 23760g	xx	2	270	92	55	38	92	44	55	36	40
64	sc 11.5.29	bp	1	242	68	37	28	63	−1	−1	−1	−1
65	sc 11.5.34	bp	1	−1	68	−1	−1	−1	39	40	35	39
66	sc 11.5.43	bp	2	−1	79	−1	−1	−1	46	45	41	32
67	sc 11.5.36	bp	2	−1	79	−1	−1	−1	43	45	43	33
68	sc 11.5.38	bp	2	−1	68	−1	−1	−1	38	39	38	27
69	sc 11.5.37	bp	2	−1	79	−1	−1	−1	47	47	44	31
70	sc 11.5.40	bp	2	−1	75	−1	−1	−1	46	43	41	39
71	sc 11.5.39	bp	2	−1	70	−1	−1	−1	43	45	37	25
72	sc 11.5.32	bp	1	−1	61	−1	−1	−1	40	42	34	29
73	sc 11.5.31	bp	1	−1	60	−1	−1	−1	43	41	29	21
74	sc 11.5.33	bp	1	−1	74	−1	−1	−1	50	44	39	33
75	sc 11.5.57	bp	2	−1	−1	−1	31	79	−1	−1	−1	−1
76	sc 11.5.65	bp	1	−1	−1	−1	27	64	−1	−1	−1	−1
77	sc 11.5.58	bp	1	−1	−1	−1	31	70	−1	−1	−1	−1
78	sc 11.5.63	bp	1	−1	−1	−1	33	85	−1	−1	−1	−1
79	sc 11.5.67	bp	1	−1	−1	−1	30	88	−1	−1	−1	−1
80	sc 11.5.68	bp	1	−1	−1	−1	−1	78	−1	−1	−1	−1
81	sc 11.5.50	bp	2	−1	−1	−1	25	68	−1	−1	−1	−1
82	sc 11.5.52	bp	1	−1	−1	−1	31	74	−1	−1	−1	−1
83	sc 11.5.61	bp	1	−1	−1	−1	35	75	−1	−1	−1	−1
84	sc 11.5.54	bp	2	−1	−1	−1	27	78	−1	−1	−1	−1
85	sc 11.5.48	bp	1	−1	−1	−1	30	80	−1	−1	−1	−1
86	sc 11.5.59	bp	2	−1	−1	−1	30	61	−1	−1	−1	−1
87	sc 11.5.69	bp	1	−1	−1	−1	−1	79	−1	−1	−1	−1
88	sc 11.5.47	bp	1	−1	−1	−1	32	75	−1	−1	−1	−1
89	sc 11.5.64	bp	1	−1	−1	−1	27	66	−1	−1	−1	−1
90	sc 11.5.46	bp	1	−1	−1	−1	34	77	−1	−1	−1	−1
91	sc 11.5.60	bp	1	−1	−1	−1	27	64	−1	−1	−1	−1

92	sc 11.5.53	bp	1	−1	−1	−1	31	80	−1	−1	−1	−1
93	sc 11.5.49	bp	2	−1	−1	−1	26	60	−1	−1	−1	−1
94	sc 11.5.70	bp	1	−1	−1	−1	−1	78	−1	−1	−1	−1
95	sc 11.5.71	bp	1	−1	−1	−1	−1	78	−1	−1	−1	−1
96	t111/gs/3a	bp	2	−1	−1	−1	31	75	−1	−1	−1	−1
97	t111/f3/s4	bp	1	−1	−1	−1	26	65	−1	−1	−1	−1
98	f1 c2us	bp	2	−1	−1	−1	31	80	−1	−1	−1	−1
99	1960 296	bi	2	202	68	41	26	70	38	40	33	30
100	1960 295	bi	2	202	75	50	28	79	40	43	34	32
101	1960 297	bi	2	193	63	35	23	65	35	37	29	24
102	mw100 333	bi	2	202	66	43	25	68	36	40	31	27
103	mw102 334	bi	2	199	67	41	24	−1	37	38	32	28
104	mw101 332	bi	2	206	−1	49	30	78	−1	−1	−1	−1
105	341 nd	bi	2	213	65	41	27	66	34	38	28	26
106	1957 mw104	bi	2	211	78	50	29	85	43	44	34	32
107	mw103 339	bi	2	206	−1	40	26	64	−1	−1	−1	−1
108	338 nd	bi	2	195	64	39	26	67	36	38	29	27
109	mw105 337	bi	2	206	74	50	28	72	40	45	33	30
110	mw106 336	bi	2	221	67	41	28	66	37	39	32	28
111	mw107 335	bi	2	193	66	45	27	69	37	40	32	28
112	mw108 348	bi	1	218	65	39	26	68	36	40	33	27
113	mw109 347	bi	1	209	66	38	25	68	34	41	28	27
114	mw110 346	bi	1	216	−1	42	27	66	−1	−1	−1	−1
115	mw111 345	bi	1	208	76	46	27	76	41	46	34	30
116	mw112 344	bi	1	205	62	38	27	64	35	37	29	26
117	mw113 343	bi	1	224	80	54	30	80	40	44	36	34
118	1959	bi	1	204	78	46	28	77	38	42	31	32
119	mw117 317	bi	1	228	81	52	32	80	41	49	38	30
120	1958 216	bi	1	203	67	45	26	71	36	38	32	28
121	1958 318	bi	1	216	80	51	30	77	41	46	34	35
122	1958 mw120	bi	1	198	68	40	27	68	34	41	30	27
123	1958 mw121	bi	1	222	68	43	29	69	−1	−1	−1	−1
124	1958 mw122	bi	1	198	64	37	25	65	34	38	30	25
125	1958 mw123	bi	1	197	70	43	27	68	37	42	32	29
126	1958 mw124	bi	1	218	69	39	27	69	35	38	32	29
127	1958 mw125	bi	1	202	68	41	27	69	34	40	30	29
128	1958 mw126	bi	1	220	66	40	27	66	38	38	33	28
129	1958 mw127	bi	1	201	67	42	28	68	36	41	32	29
130	1958 mw128	bi	2	211	80	51	31	80	43	48	38	34
131	1958 mw129	bi	2	208	74	46	30	70	−1	−1	−1	−1
132	1958 mw130	bi	2	221	75	51	32	80	40	46	32	32
133	1958 mw131	bi	2	227	76	50	30	76	38	44	34	32
134	1958 mw132	bi	2	209	73	49	30	74	37	42	34	28
135	299 mw133	bi	2	204	64	37	25	63	35	38	29	26
136	298 mw134	bi	2	206	77	50	30	76	42	46	35	32
137	1959 mw135	bi	1	198	66	40	25	66	35	41	31	27
138	1959 307	bi	1	216	78	56	32	76	39	40	33	31
139	1959 306	bi	1	206	78	49	27	77	40	43	33	33
140	1959 305	bi	2	206	67	39	24	67	36	40	30	29
141	1959 304	bi	1	205	68	39	25	66	−1	−1	−1	−1
142	1959 303	bi	2	204	76	47	28	74	38	46	31	30
143	1959 302	bi	1	200	62	39	25	62	29	39	28	23
144	1959 301	bi	1	220	75	48	29	78	40	42	36	31
145	315 mw143	bi	1	198	67	43	27	65	−1	−1	−1	−1
146	314 mw144	bi	1	215	61	38	25	63	36	40	28	25
147	1959 313	bi	1	217	71	41	30	73	38	41	34	31

148	1959 312	bi	1	201	65	40	26	65	35	40	30	26
149	1959 311	bi	1	215	77	51	31	76	39	44	36	30
150	1959 310	bi	1	210	73	49	30	70	38	43	34	30
151	24.4.28.1	bo	2	209	76	47	29	74	40	44	35	29
152	h28.904	bo	2	−1	64	40	26	64	−1	−1	−1	−1
153	0.42	bo	2	186	65	42	24	65	35	39	30	26
154	f3b 81.985	bo	2	178	52	29	20	54	30	32	25	22
155	f13c81.984	bo	2	182	57	30	20	56	31	33	26	26
156	f2 81.989	bo	2	186	54	29	20	57	31	31	25	23
157	f9c 81.986	bo	2	178	53	29	20	57	29	29	25	22
158	953.4.22.2	bo	2	175	54	27	18	53	30	33	26	23
159	953.4.22.1	bo	2	169	49	25	18	51	29	29	24	22
160	953.4.22.9	bo	2	179	54	31	20	53	30	32	24	23
161	953.4.22.9	bo	2	172	52	29	20	54	28	31	23	21
162	953.4.22.9	bo	2	176	51	28	20	52	30	29	23	22
163	953.4.22.9	bo	2	−1	43	22	17	−1	25	26	21	19
164	953.4.22.6	bo	2	177	60	34	23	60	34	32	29	28
165	953.4.22.5	bo	2	180	58	34	23	61	33	31	25	25
166	953.4.22.3	bo	2	181	53	29	21	55	32	33	25	23
167	h28.902	bo	2	−1	58	36	24	63	−1	−1	−1	−1
168	e&r 2 yrs	bb	2	202	58	27	21	57	−1	−1	−1	−1
169	e&r 2 yrs	bb	2	198	57	27	21	55	−1	−1	−1	−1
170	e&r 2 yrs	bb	2	207	60	29	22	57	−1	−1	−1	−1
171	e&r 3 yrs	bb	2	202	64	34	24	61	−1	−1	−1	−1
172	e&r 3 yrs	bb	2	223	66	35	25	63	−1	−1	−1	−1
173	e&r 5 yrs	bb	2	211	71	38	24	68	−1	−1	−1	−1
174	e&r 6 yrs	bb	2	208	69	35	25	62	−1	−1	−1	−1
175	e&r 7 yrs	bb	2	204	68	37	24	62	−1	−1	−1	−1
176	e&r 7 yrs	bb	2	205	64	36	24	61	−1	−1	−1	−1
177	e&r 7 yrs	bb	2	215	69	39	27	65	−1	−1	−1	−1
178	e&r 9 yrs	bb	2	215	70	39	24	67	−1	−1	−1	−1
179	e&r 11 yrs	bb	2	208	68	39	25	64	−1	−1	−1	−1
180	e&r 11 yrs	bb	2	206	71	43	25	66	−1	−1	−1	−1
181	e&r 12 yrs	bb	2	214	66	39	26	65	−1	−1	−1	−1
182	e&r 12 yrs	bb	2	204	66	37	23	63	−1	−1	−1	−1
183	e&r 12 yrs	bb	2	216	73	37	26	67	−1	−1	−1	−1
184	e&r 15 yrs	bb	2	214	70	41	26	69	−1	−1	−1	−1
185	e&r 16 yrs	bb	2	213	67	37	27	67	−1	−1	−1	−1
186	e&r 18 yrs	bb	2	202	69	38	26	65	−1	−1	−1	−1
187	e&r 18 yrs	bb	2	208	69	38	25	67	−1	−1	−1	−1
188	e&r 18 yrs	bb	2	208	68	37	26	66	−1	−1	−1	−1
189	e&r 2 yrs	bb	2	218	69	38	24	68	−1	−1	−1	−1
190	e&r 4 yrs	bb	2	225	75	45	28	75	−1	−1	−1	−1
191	e&r 5 yrs	bb	2	214	73	46	28	73	−1	−1	−1	−1
192	e&r 5 yrs	bb	2	212	80	49	29	77	−1	−1	−1	−1
193	e&r 5 yrs	bb	2	214	79	48	29	72	−1	−1	−1	−1
194	e&r 6 yrs	bb	2	211	73	47	29	71	−1	−1	−1	−1
195	e&r 7 yrs	bb	2	210	75	46	28	72	−1	−1	−1	−1
196	e&r 8 yrs	bb	2	228	86	50	30	78	−1	−1	−1	−1
197	e&r 8 yrs	bb	2	−1	−1	45	−1	76	−1	−1	−1	−1
198	e&r 9 yrs	bb	2	218	80	48	28	77	−1	−1	−1	−1
199	e&r 10 yrs	bb	2	220	76	50	29	76	−1	−1	−1	−1
200	e&r 10 yrs	bb	2	210	76	48	30	72	−1	−1	−1	−1
201	e&r 14 yrs	bb	2	231	84	55	31	80	−1	−1	−1	−1
202	e&r 17 yrs	bb	2	209	82	46	28	69	−1	−1	−1	−1
203	e&r 17 yrs	bb	2	223	−1	−1	31	75	−1	−1	−1	−1

204	e&r 17 yrs	bb	2	230	88	50	31	78	−1	−1	−1	−1
205	e&r 18 yrs	bb	2	221	85	52	32	77	−1	−1	−1	−1
206	892.3.15.1	bb	2	−1	73	44	25	73	39	42	34	33
207	892.3.15.2	bb	2	−1	63	37	25	64	35	35	30	25
208	45.10.13.2	bb	2	207	79	47	26	73	38	46	32	31
209	48.10.29.1	bb	2	210	73	39	26	65	36	42	32	28
210	949.6.29.1	bb	1	209	72	37	25	65	35	40	31	29

2. Metatarsals

1	n27945719	bp	2	293	70	46	39	78
2	n26945709	bp	1	291	77	44	38	80
3	n27045710	bp	1	292	76	48	37	−1
4	n27845718	bp	1	298	76	46	40	84
5	n28045720	bp	2	292	74	45	38	80
6	n27345713	bp	2	307	79	50	42	85
7	n27645716	bp	2	288	75	46	38	87
8	n27745717	bp	1	292	78	50	40	82
9	n27545715	bp	2	286	70	47	40	81
10	n27445714	bp	2	292	70	47	38	79
11	n26845708	bp	1	300	76	46	39	83
12	n27145716	bp	1	282	70	48	40	−1
13	m28 45419	bi	2	291	68	42	38	78
14	m26 45417	bi	1	288	61	44	35	76
15	m30 45421	bi	2	284	62	40	35	71
16	m29 45420	bi	2	278	63	38	37	75
17	m31 45422	bi	2	288	60	38	35	70
18	m27 45418	bi	1	−1	62	37	34	−1
19	ba d31914	bp	2	282	63	38	35	76
20	ba d31913	bp	1	290	73	50	39	84
21	ba d31912	bp	2	282	67	42	34	75
22	ba d31922	bp	2	263	60	35	32	70
23	ba d31921	bp	1	259	59	36	33	70
24	ba d31920	bp	2	279	58	35	35	70
25	ba d28764	bi	2	253	53	29	27	62
26	ba d28765	bp	2	289	65	48	39	78
27	ba d28766	bp	1	280	56	35	35	66
28	ba d29570	bi	2	266	56	35	31	67
29	ba d29571	bp	1	267	64	38	32	70
30	ba d30993	bi	2	295	74	50	42	89
31	ba d30994	bi	1	283	66	44	36	76
32	ba d30995	bi	2	278	65	39	35	75
33	ba d30996	bi	1	262	62	40	36	73
34	ba d31049	bi	1	273	67	45	37	77
35	sm 705969	xx	1	274	63	40	36	79
36	sm no ref	xx	1	280	72	43	38	83
37	s38 86.25	bp	1	297	62	41	37	73
38	ts nzh	bp	1	274	−1	45	37	80
39	ts nzh	bp	1	268	60	39	35	−1
40	cl 27960	bp	2	290	61	39	38	66
41	cl 39499	xx	2	277	50	36	34	64
42	cl 39502	xx	2	293	67	48	39	72
43	cl 39501	xx	1	292	70	51	40	81
44	cl 39500	xx	2	−1	62	40	36	−1

45	cl m15522	xx	1	298	68	43	36	76
46	cl m15523	xx	1	278	60	39	37	67
47	cl m15521	xx	2	307	68	46	38	81
48	sw umg Ho	xx	1	281	55	36	35	65
49	sw lg	bi	2	289	59	37	35	67
50	sw basalg	xx	1	291	56	35	34	67
51	gr 21298a	xx	2	323	80	49	40	87
52	sc9.17.77	bp	1	−1	56	−1	−1	−1
53	sc1.5.87	bp	2	−1	57	−1	−1	−1
54	sc1.5.100	bp	2	−1	−1	−1	33	70
55	sc11.5.93	bp	2	−1	−1	33	31	63
56	sc1.5.112	bp	1	−1	−1	−1	33	76
57	sc11.5.86	bp	2	−1	66	−1	−1	−1
58	sc11.5.91	bp	1	−1	67	−1	−1	−1
59	sc11.5.88	bp	1	−1	64	−1	−1	−1
60	sc11.5.92	bp	1	−1	62	−1	−1	−1
61	sc1.5.105	bp	1	−1	−1	−1	34	64
62	sc11.5.99	bp	1	−1	−1	−1	32	65
63	sc11.5.97	bp	1	−1	−1	−1	32	64
64	sc1.5.110	bp	2	−1	−1	−1	35	68
65	sc1.5.102	bp	1	−1	−1	−1	32	69
66	sc1.5.104	bp	1	−1	−1	−1	34	70
67	sc1.5.101	bp	2	−1	−1	−1	35	69
68	sc1.5.107	bp	1	−1	−1	−1	34	69
69	sc1.5.108	bp	1	−1	−1	−1	32	64
70	sc11.5.94	bp	1	−1	−1	−1	31	68
71	sc1.5.113	bp	2	−1	−1	−1	34	68
72	mw 201227	bi	2	270	67	43	36	79
73	mw 208228	bi	2	250	52	31	29	61
74	mw 202229	bi	2	246	52	30	28	57
75	mw 203230	bi	2	251	50	31	29	61
76	mw 204231	bi	2	253	50	30	29	60
77	mw 200232	bi	1	276	63	36	33	70
78	mw 205233	bi	2	252	50	31	28	60
79	mw 206234	bi	1	251	53	32	28	61
80	mw 209243	bi	1	258	60	40	32	69
81	mw 210242	bi	1	271	54	36	32	64
82	mw 211241	bi	2	253	53	31	30	60
83	mw 213239	bi	2	251	52	32	29	63
84	mw 214238	bi	1	252	52	33	30	60
85	237	bi	1	242	53	33	29	60
86	236	bi	2	243	53	33	29	61
87	mw 217225	bi	2	259	52	31	29	60
88	mw 219224	bi	1	264	56	33	31	65
89	mw 228223	bi	1	240	49	30	29	59
90	214	bi	2	237	−1	31	27	61
91	212	bi	2	253	56	36	31	65
92	210	bi	2	263	58	40	33	66
93	211	bi	2	263	55	38	32	65
94	215	bi	2	254	53	31	29	61
95	222	bi	1	258	53	33	30	63
96	212	bi	2	268	63	37	31	67
97	mw 227216	bi	2	248	52	34	30	60
98	mw 229213	bi	1	246	48	28	26	58
99	218	bi	1	257	61	37	30	65
100	221	bi	1	263	53	32	30	61

101	226	bi	1	249	50	32	29	59
102	220	bi	1	245	48	32	29	58
103	mw 234203	bi	2	269	65	41	34	75
104	mw 235206	bi	2	270	58	36	30	67
105	207	bi	1	271	61	37	32	71
106	205	bi	2	251	50	33	28	57
107	204	bi	1	257	56	35	30	67
108	208	bi	1	262	64	39	34	74
109	24.4.28.1	bo	2	240	65	36	33	66
110	H28.904	bo	2	−1	52	32	30	55
111	0.42	bo	2	212	55	33	28	57
112	f3b81.985	bo	2	207	47	24	23	51
113	f13c81984	bo	2	−1	−1	26	24	53
114	f2.81.989	bo	2	215	49	25	23	53
115	f9c81.986	bo	2	209	47	25	23	52
116	53.4.22.2	bo	2	207	45	22	22	50
117	53.4.22.1	bo	2	−1	43	21	21	50
118	53.4.22.9	bo	2	185	39	19	19	44
119	53.4.22.9	bo	2	209	45	25	23	52
120	53.4.22.9	bo	2	205	41	21	20	−1
121	53.4.22.9	bo	2	−1	43	21	21	−1
122	53.4.22.6	bo	2	207	50	28	26	57
123	53.4.22.5	bo	2	214	48	30	26	56
124	53.4.22.4	bo	2	212	46	25	23	49
125	53.4.22.3	bo	2	211	45	24	23	52
126	h28.902	bo	2	−1	50	30	27	56
127	e&r 2 yrs	bb	2	242	47	24	25	51
128	e&r 2 yrs	bb	2	256	49	26	28	55
129	e&r 3 yrs	bb	2	252	53	29	30	57
130	e&r 3 yrs	bb	2	278	53	33	31	60
131	e&r 5 yrs	bb	2	260	58	31	31	61
132	e&r 6 yrs	bb	2	256	52	30	30	56
133	e&r 7 yrs	bb	2	258	56	31	32	57
134	e&r 7 yrs	bb	2	254	54	32	31	57
135	e&r 7 yrs	bb	2	268	55	32	31	60
136	e&r 9 yrs	bb	2	270	55	33	33	62
137	e&r 11 yrs	bb	2	254	55	32	32	59
138	e&r 11 yrs	bb	2	260	55	32	33	61
139	e&r 12 yrs	bb	2	265	56	33	33	60
140	e&r 12 yrs	bb	2	253	53	30	37	56
141	e&r 15 yrs	bb	2	263	58	33	34	64
142	e&r 16 yrs	bb	2	261	56	32	32	60
143	e&r 18 yrs	bb	2	249	56	33	32	60
144	e&r 18 yrs	bb	2	259	57	32	33	61
145	e&r 18 yrs	bb	2	256	57	31	38	62
146	e&r 2 yrs	bb	2	270	56	30	29	53
147	e&r 4 yrs	bb	2	282	63	38	36	69
148	e&r 5 yrs	bb	2	267	61	39	35	64
149	e&r 5 yrs	bb	2	260	64	40	35	71
150	e&r 5 yrs	bb	2	262	62	40	36	66
151	e&r 6 yrs	bb	2	258	60	39	35	64
152	e&r 7 yrs	bb	2	259	63	39	36	66
153	e&r 8 yrs	bb	2	281	69	40	39	69
154	e&r 8 yrs	bb	2	273	62	38	36	67
155	e&r 9 yrs	bb	2	269	61	36	32	67
156	e&r 10 yrs	bb	2	270	64	41	36	69

157	e&r 10 yrs	bb	2	257	63	39	36	65
158	e&r 14 yrs	bb	2	288	69	42	40	72
159	e&r 17 yrs	bb	2	256	61	37	35	62
160	e&r 17 yrs	bb	2	273	67	40	38	70
161	e&r 17 yrs	bb	2	288	64	40	38	70
162	e&r 18 yrs	bb	2	275	69	40	40	69
163	92.3.15.1	bb	2	−1	58	38	30	69
164	92.3.15.2	bb	2	−1	55	−1	29	61
165	4510.13.2	bb	2	255	61	41	30	67
166	4810.29.1	bb	1	263	54	31	29	58
167	49.6.29.1	bb	2	−1	56	30	30	59

3. Calcanea

1	n257 45697	bp	1	197	78	20	17
2	n255 45695	bp	1	181	63	18	15
3	n251 45691	bp	1	196	71	19	16
4	n253 45693	bp	1	201	71	18	19
5	n256 45696	bp	1	186	73	18	13
6	n252 45692	bp	1	196	70	20	15
7	n263 45703	bp	2	193	69	15	15
8	n254 45694	bp	1	191	71	19	16
9	n262 45702	bp	2	186	77	19	16
10	bar 1901	bp	2	177	66	16	14
11	bar 1901	bp	2	173	65	15	12
12	bar no ref	bp	2	160	55	12	11
13	ba bn35b46	bi	2	162	54	13	11
14	bar clare	bi	2	166	61	13	13
15	bar b143a	bi	1	161	52	14	10
16	bar 1911	bi	1	180	65	15	13
17	bar bn31	bi	1	177	68	15	12
18	ba b144b45	bp	2	180	63	18	15
19	bar b135b	bi	2	161	62	13	11
20	bar 1901	bp	1	177	65	15	14
21	bar 1900	bp	2	181	64	16	15
22	bar b135	bp	1	189	69	19	17
23	s48.128.19	xx	2	188	67	17	15
24	cl 28005	bp	1	196	71	20	16
25	cl m20116	xx	1	158	57	−1	−1
26	cl m20120	xx	1	188	67	21	17
27	cl m20117	xx	1	−1	66	21	17
28	cl m20118	xx	1	182	61	17	15
29	cl m20122	xx	2	192	71	17	14
30	cl m20125	xx	2	183	58	−1	−1
31	cl m20126	xx	2	191	66	−1	−1
32	cl m20119	xx	1	198	70	17	15
33	cl m20121	xx	1	195	67	17	14
34	cl m20123	xx	2	173	56	13	13
35	cl m20124	xx	2	196	67	17	17
36	gr47 20800	xx	1	198	71	21	16
37	gr52 27927	xx	2	194	73	19	15
38	sc11.5.152	bp	1	−1	50	13	11

39	sc11.5.150	bp	1	185	68	16	15
40	sc11.5.154	bp	2	−1	53	15	16
41	263 1959	bi	1	165	59	15	10
42	256 1959	bi	2	162	47	13	11
43	257 1957	bi	1	159	59	14	11
44	256 1957	bi	2	148	53	13	11
45	24 4.28.1	bo	2	162	58	14	12
46	h28.904	bo	2	134	51	−1	−1
47	0.42	bo	1	138	51	14	11
48	f3b81.985	bo	2	124	42	12	09
49	f281.989	bo	2	129	41	12	10
50	f9c81.986	bo	2	125	41	13	10
51	53.4.22.2	bo	2	−1	40	11	10
52	53.4.22.1	bo	2	−1	36	10	10
53	53.4.22.9	bo	2	−1	34	09	08
54	53.4.22.9	bo	1	−1	41	10	10
55	53.4.22.6	bo	1	131	46	13	10
56	53.4.22.5	bo	2	132	44	11	11
57	53.4.22.3	bo	2	125	37	12	09
58	h28.902	bo	2	133	57	−1	−1
59	e&r 2 yrs	bb	2	129	46	−1	−1
60	e&r 2 yrs	bb	2	−1	50	−1	−1
61	e&r 3 yrs	bb	2	146	49	−1	−1
62	e&r 3 yrs	bb	2	163	51	−1	−1
63	e&r 5 yrs	bb	2	154	52	−1	−1
64	e&r 6 yrs	bb	2	145	50	−1	−1
65	e&r 7 yrs	bb	2	149	49	−1	−1
66	e&r 7 yrs	bb	2	148	50	−1	−1
67	e&r 7 yrs	bb	2	160	54	−1	−1
68	e&r 9 yrs	bb	2	157	54	−1	−1
69	e&r 11 yrs	bb	2	148	51	−1	−1
70	e&r 11 yrs	bb	2	155	58	−1	−1
71	e&r 12 yrs	bb	2	154	51	−1	−1
72	e&r 12 yrs	bb	2	142	50	−1	−1
73	e&r 15 yrs	bb	2	161	56	−1	−1
74	e&r 16 yrs	bb	2	152	56	−1	−1
75	e&r 18 yrs	bb	2	145	52	−1	−1
76	e&r 18 yrs	bb	2	154	53	−1	−1
77	e&r 18 yrs	bb	2	153	55	−1	−1
78	e&r 2 yrs	bb	2	154	57	−1	−1
79	e&r 4 yrs	bb	2	180	−1	−1	−1
80	e&r 5 yrs	bb	2	162	−1	−1	−1
81	e&r 5 yrs	bb	2	169	62	−1	−1
82	e&r 5 yrs	bb	2	163	−1	−1	−1
83	e&r 6 yrs	bb	2	160	57	−1	−1
84	e&r 7 yrs	bb	2	163	59	−1	−1
85	e&r 8 yrs	bb	2	180	65	−1	−1
86	e&r 8 yrs	bb	2	169	57	−1	−1
87	e&r 9 yrs	bb	2	163	58	−1	−1
88	e&r 10 yrs	bb	2	168	−1	−1	−1
89	e&r 10 yrs	bb	2	160	61	−1	−1
90	e&r 14 yrs	bb	2	179	66	−1	−1
91	e&r 17 yrs	bb	2	156	−1	−1	−1
92	e&r 17 yrs	bb	2	170	64	−1	−1
93	e&r 17 yrs	bb	2	181	62	−1	−1
94	e&r 18 yrs	bb	2	175	66	−1	−1

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95	892.3.15.1	bb	2	157	60	15	10
96	892.3.15.2	bb	2	148	57	13	12
97	45.10.13.2	bb	2	166	59	15	12
98	46.12.17.1	bb	2	171	50	15	10
99	947.7.16.5	bb	2	158	55	14	11
100	949.6.29.1	bb	2	155	53	13	11

Key to lists of bones measured and specimen numbers

Details are presented in the following order:

(a) Museum number (see below for key).
(b) Museum identification (bp = *Bos primigenius*; bi = *Bison*; xx = *Bos/Bison*) Also, bo = *Bos taurus* and bb = *Bison bonasus.*
(c) Hand (1 = right, 2 = left).
(d) Measurements (m/c: GL, Bp, SD, DD Bd, 1, 2, 3, 4; m/t: GL, Bp, SD, DD, Bd; calc: GL, GB, 1, 2).

Key to specimen numbers

n	Uphall Pit, Iford (bp)
m	Uphall Pit, Ilford (bi)
ba/bar	Barrington
383.	Beetley
sm	Swanton Morley
s	Stutton
ts	Trafalgar Square
cl	Clacton-on-Sea
sw	Barnfield Pit, Swanscombe
gr	Grays
sc	Star Carr
t	Thatcham
fl	Flixton
mw date 3-figure number	Willment's Pit, Isleworth
24. h28.904 0.42	Chartley cattle
f2-13c 53./953. h28.902	Chillingham cattle
e&r	Polish bison
892./92. 45./4510. 46. 48./4810. 49./949. 947.	bison in BM (NH)

Appendix 3. The Measurements

The measurements are listed in the following order:

Metacarpal (Fig 19, 20 and 21)

Greatest length (GL)
Greatest breadth of the proximal end (Bp)
Smallest breadth of the diaphysis (SD)
Smallest depth of the diaphysis (DD)
Greatest breadth of the distal end (Bd)
Greatest anterior–posterior thickness of the articular surface for carpals 2+3 (measurement 1)
Greatest breadth of the articular surface for carpals 2+3 (measurement 2)
Greatest anterior–posterior thickness of the articular surface for carpal 4 (measurement 3)
Greatest breadth of the articular surface for carpal 4 (measurement 4)

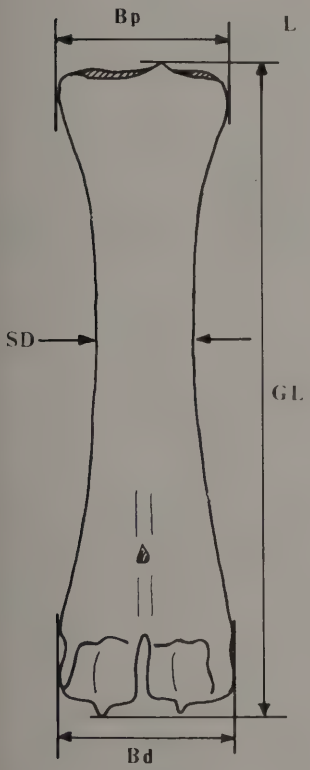

Fig. 19

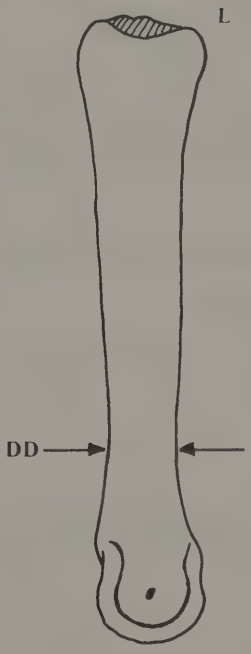

Fig. 20

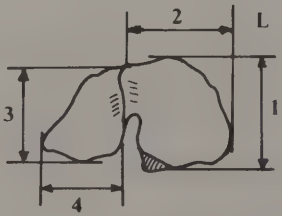

Fig. 21

Fig. 19 Metacarpal, anterior view. Measurement points.

Fig. 20 Metacarpal, lateral view. Measurement points.

Fig. 21 Metacarpal, proximal articular surfaces. Measurement points.

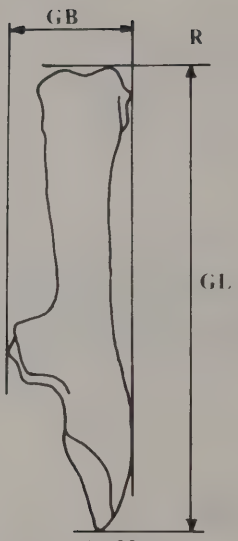

Fig. 22

Fig. 23

Fig. 22 Calcaneum, posterior view. Measurement points.

Fig. 23 Calcaneum, articular surfaces for the central tarsals and the astragalus. Measurement points.

Metatarsal (measurements as for metacarpal, Figs 19 and 20)

Greatest length (GL)
Greatest breadth of the proximal end (Bp)
Smallest breadth of the diaphysis (SD)
Smallest depth of the diaphysis (DD)
Greatest breadth of the distal end (Bd)

Calcaneum (Figs 22 and 23)

Greatest length (GL)
Greatest breadth (GB)
Breadth of the articular surface for the central tarsals (measurement 1)
Breadth of the articular surface for the astragalus (measurement 2)

Middle Stages of the Cusichaca Archaeological Project, Peru

by ANN KENDALL

Location and background

Cusichaca is the name of a valley located in the Department of Cuzco, Urubamba Province, which is divided by its river into the districts of Ollantaytambo and Machu Picchu (Fig. 1). The area comprises a series of different ecological zones over 25 km from the foot of snowy Mt Salcantay at 4,300 m altitude, down to the banks of the river Vilcanota/Urubamba, to 2,500 m altitude above sea level – in a transition zone where mountain vegetation merges with the fringes of the jungle.

The many archaeological sites reflect the high level of economic activity which flourished in the region during late pre-Hispanic times. The area was intensively cultivated in the pre-Inca period, at least from *c.* AD 1000. The arrival of the Incas in the mid-15th century led to a reorganisation of the zone in Pachacutec's reign, to increase the agricultural efficiency of the valley especially with regard to maize production. The economic development which ensued from Inca expansion may well have been the prelude to the construction of Machu Picchu. Three Inca roads linking Cuzco with Machu Picchu pass through the zone in question. One runs over the mountains, the other two follow the banks of the Urubamba river and pass through Ollantaytambo (Kendall, 1983).

The most important archaeological remains of the Inca period consist of the promontory fort at Huillca Raccay, the town of Patallacta (Plate I) and two small ceremonial sites, Pulpituyoc and Huayna Quente, along with their integrated terrace remains and respective hydraulic systems, all of which formed an intrinsic part of land exploitation (Fig. 2). The architectural evidence suggests that the main sites were contemporaneous although Huayna Quente was added somewhat later, almost certainly after the building of Machu Picchu (Kendall, 1976, 1983).

In the Cusichaca valley drainage the settlement pattern study shows the Inca population of the valley and its agricultural activity were heavily concentrated in the lower valley between 2,500 and 2,800 m altitude. The mid-valley was only occupied by self-contained small settlements at the confluence of rivers where the main crossing communications system between Huarocondo and Machu Picchu entered and exited from the Cusichaca valley between 2,800 and 3,000 m altitude. Above this the upper reaches were dominated by well-placed observation posts and *tambo* (inn) accommodation for travellers and those on state business.

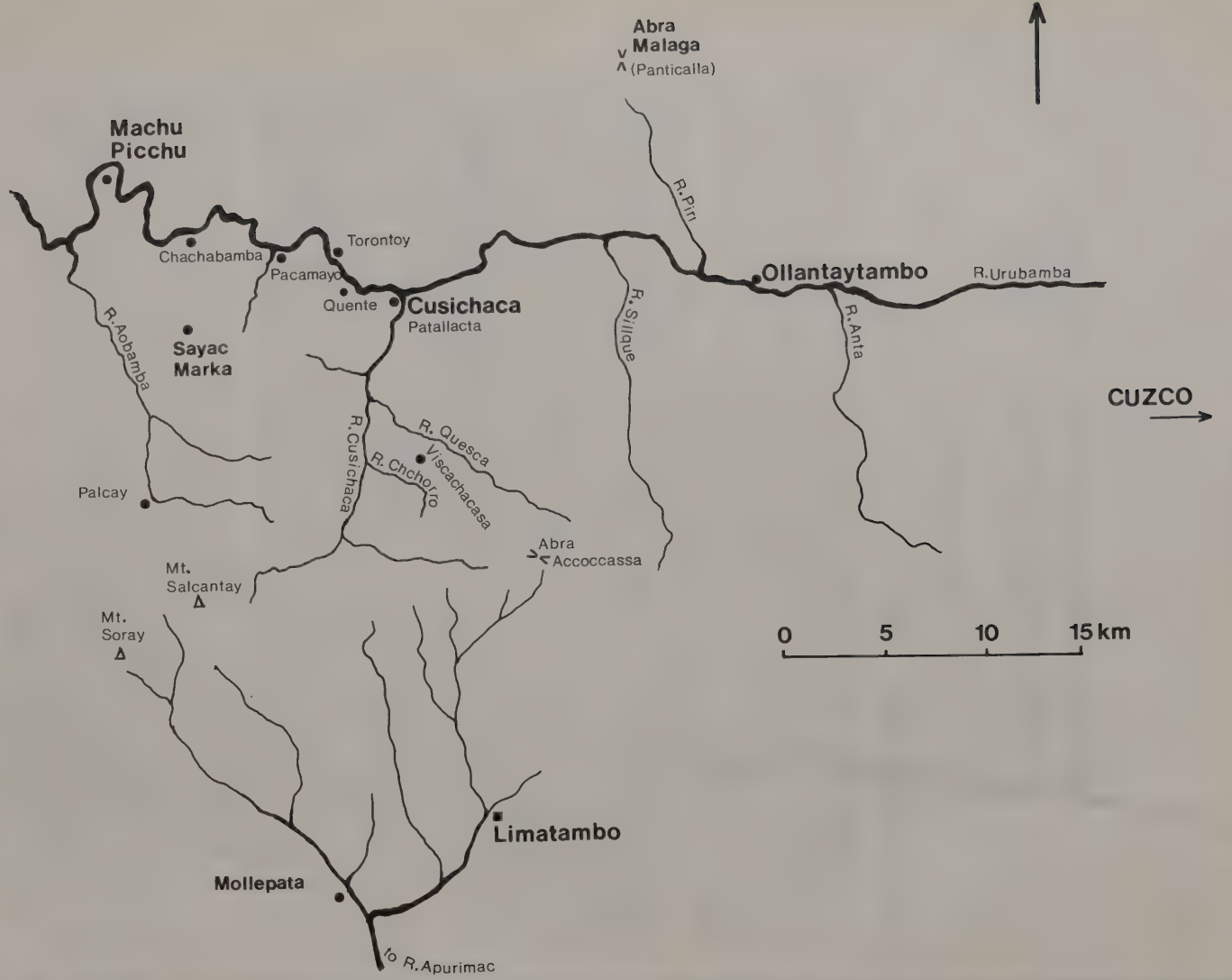

Fig. 1 Location map showing the area between Ollantaytambo and Machu Picchu.

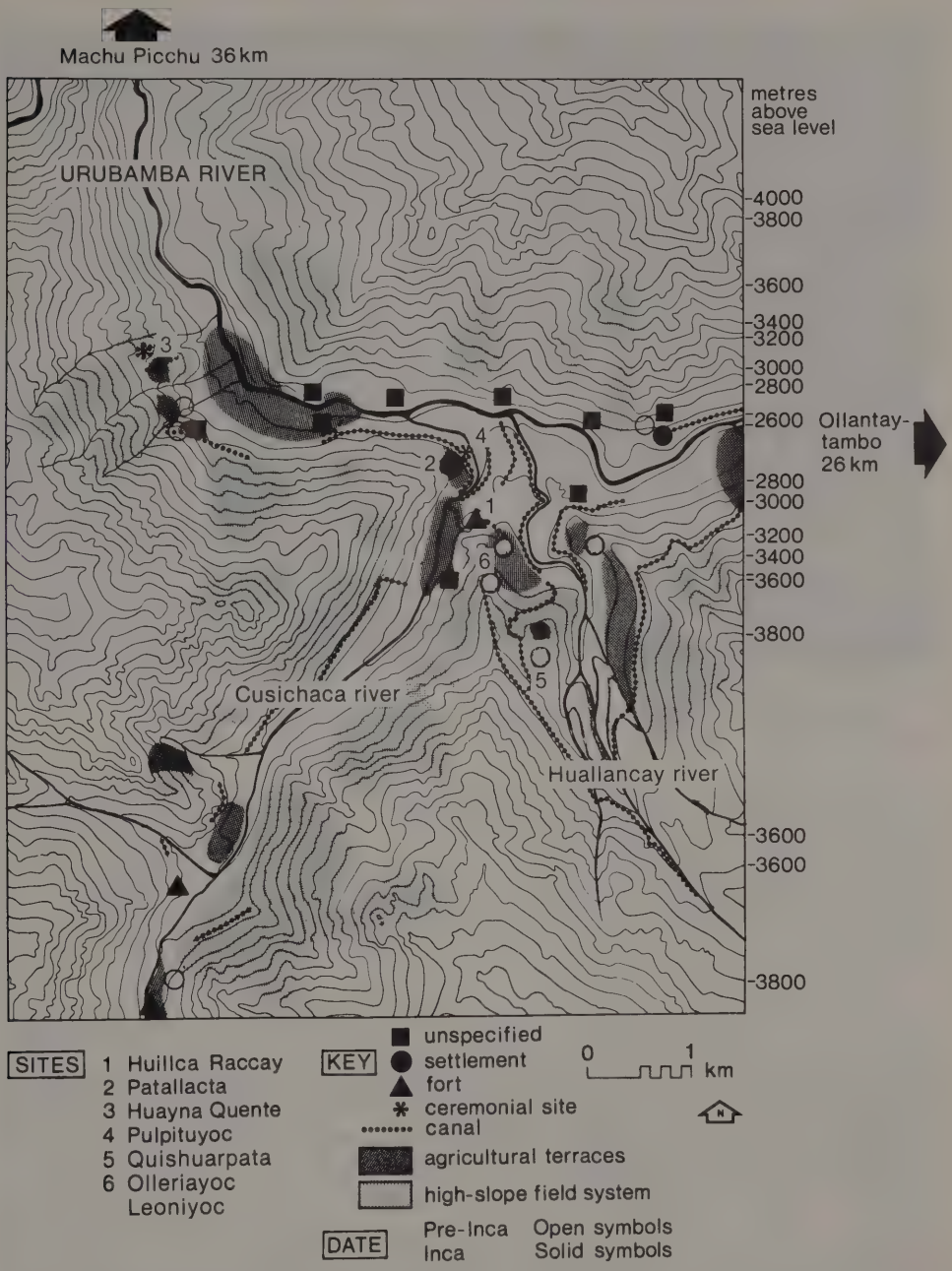

Fig. 2 Diagrammatic representation of site and major terrace and field systems in the lower Cusichaca valley area.

Plate I Patallacta at top left and Pulpituyoc at the riverside, upper right.

Sites dating from the Late Intermediate period have also been found together with their associated terrace and canal systems. A clearly different pattern of settlement emerges for this period with a concentration of the largest settlements around 3,000–3,200 m either on ridges or in the mid-valley zones. (A study of the Late Horizon (Inca) and Late Intermediate period site settlement patterns with their land systems, was presented in a paper at the 1982 ICA meeting and is to be published in 1984 in *British Archaeological Reports.*)

Today the economic development of the past is largely ignored. When the project began most of the canals lay either neglected or totally destroyed. Many terrace schemes are dry and the vegetation has changed dramatically in the 20th century. Population levels in the area fell critically following the Spanish conquest in the 16th century and there is evidence from the excavations that the Inca organisation of the area broke down almost immediately after the conquest

Objectives

The Cusichaca Project embarked on the present programme of work in 1977. In 1978 a contract was signed with the Instituto Nacional de Cultura (National Insti-

tute of Culture – INC) to carry out a plan of work including excavation, environmental studies, reconnaissance of a wider area and an experimental scheme to rehabilitate an abandoned agricultural system. In addition, the programme of investigation includes research into aspects of complementary interest to the archaeology such as ethnohistory and ethnography, soil studies and use of irrigated and non-irrigated lands. Clearing and consolidation work is carried out concurrently by the INC under the supervision of a master stonemason and the direction of the Project's two co-directors, Jose Gonzales Corrales and Justo Torres.

A summary of the initial stages of the Project's work was presented to the IVth Congress of Man and the Andean Culture in Cuzco and published in English in this *Bulletin* in 1979 (No. 16), as well as in the March 1980 edition of the *Lima Bulletin* (expanded version in Spanish). We concentrate now on the progress made from 1978 to 1982.

Each field season lasts about four months with the participation of up to 80 people including key project members who organise and carry out the various aspects of the investigations (see Acknowledgements).

The overall aims of the Project are unchanged, as follows:

(a) To study prehistoric cultural and economic development in a zone of high agricultural activity.
(b) To compile a local chronology of pottery produced during nearly 3,000 years of occupation.
(c) To study and interpret the function of the remains of the Inca occupation.
(d) To study the impact of the Inca occupation on the culture of the Late Intermediate period and compare these periods.
(e) To assess the methodological approach to Late period studies in Peruvian archaeology.
(f) To judge how information provided by the research, together with available knowledge of technology applied in the past, may best be made use of by the rural economy of the present day.

The excavations

In 1979 and 1980 the excavation strategy continued to place initial emphasis on investigation and retrieval of the main series of occupation levels found in the region at the site of longest duration – the fort of Huillca Raccay. The site shows evidence of nearly 3,000 years of occupation dating from the formative period to some post-Inca occupation. The standing architectural remains are of the classical Inca styles (*c.* AD 1450) of the reign of Pachacutec. This much can be inferred both from the study of the development of the region as well as from the simplicity of the classical architectural style. As with adjacent Inca sites of the same period, the fort was evidently planned as a total complex with a preconceived layout. It was built quickly, judging from its fairly

shallow base foundations, relative lack of key stones and generally poor standard of construction.

In 1981 the excavation strategy was extended to include other Inca sites of the Cusichaca complex and to sample the main pre-Inca sites. The overall aim of the present excavations is two-fold:

1. To isolate and collect pot deriving from the various stages of occupation.
2. To identify the human activities which took place in the residential and ceremonial zones.

Method

The archaeological deposits of the Inca and of many pre-Inca surface sites are not very deep and surface stratigraphy has been disturbed by the action of roots, rainfall, reoccupation, animals and sometimes cultivation. However, to facilitate excavation and even retrieval of some contexts and features in the uppermost context layers disturbed mainly by vegetation, an excavation technique was adopted which combined digging in thin spits with total planning-in of finds, a process which allowed the superimposition of features and finds. This approach has given some results in assessing the relationships of finds and features in relatively disturbed contexts. At this stage, without having analysed the results more fully, it is impossible to assess the real profitability of the technique in terms of man hours necessary to carry it out. It is applied most consistently within Inca buildings where the objective is to identify activity areas. When this technique is not utilised the finds are bagged per 50 cm squares within contexts.

The system of planning-in all finds is not usually applied to pre-Inca deposits under Inca deposits since these are often either fills or clearly stratified deposits in which finds may be adequately recorded in 50 cm squares. However, finds may be planned-in when a complete pre-Inca structure is excavated.

The Inca levels at Huillca Raccay fort

The architectural studies and planning work carried out on the fort have allowed us to differentiate broadly between the several areas reserved for separate functions and/or for differently organised sociological groups (Kendall, 1974). With the evidence provided by the excavations, we hope to be able to evaluate the standard of living during the period in question as well as the variety of activities engaged in by each group. Basing ourselves on the hypothesis that the fort functioned as the site of initial occupation and Inca control, we also set out to discover how its role had altered during the Inca period. In all we have now excavated 15 of the 28 structures as well as parts of eight open or patio areas (Fig. 3). Gill Hey has been in charge of the execution of the fort excavations throughout this period.

Since very little was known about the way in which Inca interior and exterior spaces may have been divided up using organic impermanent materials, care was taken

Fig. 3 Excavations at Chuncuchua, Huillca Raccay fort.

Plate II Building 2 after removal of Inca contexts, showing post-holes in line with the edge of the doorway and an Early Horizon pit at the top right hand corner, Huillca Raccay fort.

to look for evidence of post-holes. Of those found, most were not associated with the Inca period complexes but belonged to either a later or an earlier period.

Inside the Inca structures we have found few subdivisions of the interior areas. However, features included platforms articulated by stone walls, benches, groups of stones fastened to the wall marking the spot where a payment or offering took place, and post-holes lined up with the doorway (see Plate II) to support a *marca* (a first-storey loft-type construction). In one case, a possible storehouse was built within a large structure (B.28; Plate III). Remains of floor surfaces were found although these were not extensive. Generally speaking, floor surfaces were only preserved in the corners of structures and usually consisted of well-trodden earth. In rare instances patches of a clay lining have been found, e.g. B.20 and the internal structure in B.28. It should be noted that some of the surfaces were very uneven and contained evidence of patching. Although wall trenches were found, located at the inside of buildings, these were not very wide or deep. In the case of B.1, the promontory had been extended by building a terraced platform which supported the semi-circular back exterior wall where the site overlooked the gorge point access to the Cusichaca valley.

The structures in which most archaeological information is preserved are those with two storeys, particularly those in which wall collapse has acted as a protection for occu-

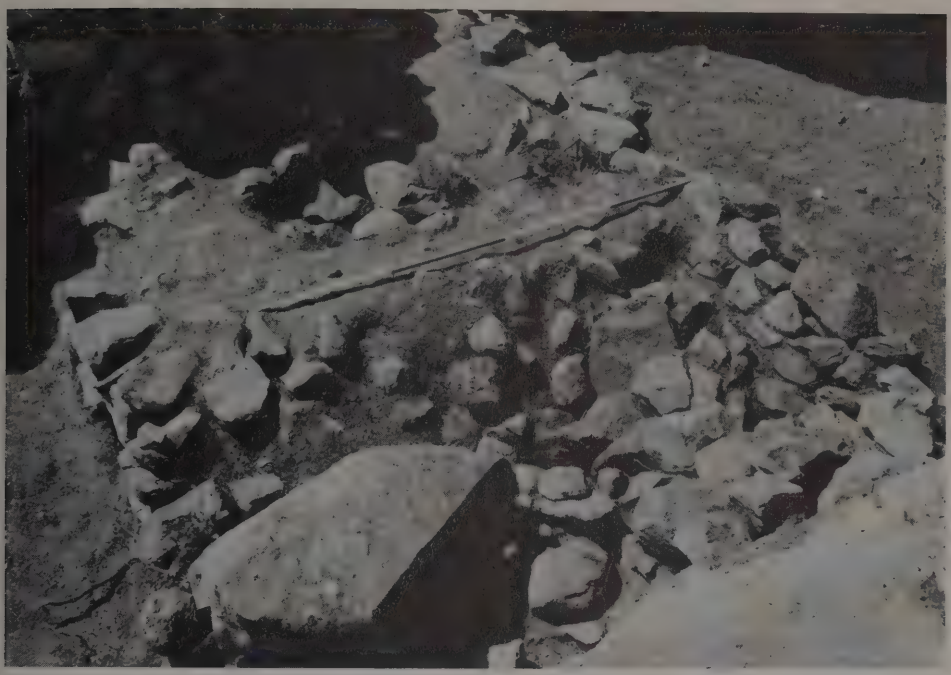

Plate III Building 28 showing the internal structure, Huillca Raccay fort.

pation material. The best example of this, B.20, was a collapsed building which was found to contain covered occupation over 30 cm deep beneath the adobe bricks which had fallen from the building's upper storey (Plate IV). The structure formed part of a double building with a common side wall. Given the absence of clear evidence elsewhere to indicate the use of adobes in any other area, except for in its sister structure B.19, it was a particularly interesting find containing a well-preserved post-Inca occupation overlying the Inca occupation, which in turn overlay several strata of pre-Inca occupations.

During the Inca period of about 90 years duration, the original plan was modified in several ways:

(a) The architectural design of the main point of access and of Group 5 (see Fig. 3) at the east end of the fort was remodelled. Building 28 was built and a path cut between Group 4 and the exterior group of buildings. This helps to explain the unusual design of B.28, which is more easily attributable to the middle of the Late Horizon (Inca) period (Topa Inca). (N.B. Three phases of classical (Imperial) Inca architecture can be recognised which for lack of a scientific method of dating are approximated with the aid of the ethnohistorical records to the reigns of the Inca emperors: Pachacutec (1), Topa Inca (2) and Huayna Capac (3).)

Plate IV Building 20 showing the adobe bricks which had fallen from the upper storey, Huillca Racay fort.

(b) Some architectural details of Building 1 in the westernmost group show this structure was modified as were the small rooms within the exterior Group 5 at the eastern extreme of the fort, in such a way as to suggest a change of function in both areas.

(c) The rear wall of Building 4 in Group 2 was rebuilt because of promontory erosion.

Point (b) above indicates that the site's function did indeed undergo a change. The modifications made to B.1, Group 1, appear to have turned what was originally a lookout post into a dwelling unit whilst those made to B.28, Group 4, separated Groups 4 and 5 and allowed better observation and control of the Inca road which ran between the two groups after remodelling.

Pre-Inca occupation under the fort of Huillca Raccay

To investigate the pre-Inca periods, we took advantage where possible of the evidence lying beneath the Inca occupation: a complex network of pits and burials which often intersect each other. The Late Intermediate period is represented by characteristic circular/oval foundations, pits and burial pits, and 'Killke-related' pottery. Some of

the best-preserved features are of the first millennium BC, cut in the natural and in the stratified remains of the Early Horizon period. In Building 2, Group 2, a concentration of pre-Inca Paqallamoqo pottery dating from late in the first millennium BC, was found in the sealed context of a circular pit (Plate II). Together with other finds of this period, this was important since for the first time a description of the style in question is now possible. Other pits with Early Horizon material have been found in B.27 and B.26. A great many finds dating from the Early Horizon, represented by the Marcavalle and Chanapata cultures, are also obtained from the excavation of the earliest occupation of the site and have still to be studied. A radiocarbon date of 430 BC ∓ 70 years has recently been obtained from a sample of charcoal (BM-1633) excavated from between two floor levels of Early Horizon occupation identified in a 1975 test pit in B.17.

The strategy began last year of excavating the pre-Inca levels in the two open court areas, A.22 and A.6, where the occupation deposits are known to be well stratified, should be completed in 1983.

The burial pits most concentrated in Area 1 and B.20 but dispersed temporally and geographically over the promontory, contain no more than skeletal adult and child remains. Human burials dating from the pre-Inca periods are relatively frequent and indicate that it was customary for the dead to be buried near to the dwelling area. Some burials might be expected originally to have been covered by *chullpas* (dome roofed tombs), built of stones which were subsequently levelled and the stones redeployed. However, the existing evidence suggests cairns were more likely. Bone samples have been taken for dating and examination for the maize content of the diet.

It should be noted that at Huillca Raccay the main representative occupation periods from the early first millennium BC have been located with the following two exceptions:

1. The Early Intermediate period about which nothing is known in this region, but into which the Chanapata and Paqallamoqo pottery styles may overlap and continue in production.
2. The Middle Horizon period of which so far only a few either undecorated or undiagnostic sherds have been found, which may belong to the Huari culture. However even in the absence of any other diagnostic classical features identifiable with either this style or an occupation, it is possible that the period may be represented. It is thought that utilitarian wares with a distinctive paste resembling that of the Middle Horizon from the Lucre Basin at Piquillacta may prove to represent this period at Cusichaca, in which case it has some limited representation at this site.

Current excavations

Patallacta is a major Inca occupation site in Cusichaca also containing evidence of Late Intermediate period occupation. It consists of four residential sectors and an asso-

Plate V Excavation of Building 10 and the adjacent court with two boulders, A.7 at Pulpituyoc.

ciated water distribution network with fountain baths. A minimum of one unit in each sector has been selected for excavation.

Adjacent to Patallacta, *Pulpituyoc* is a small ceremonial complex made up of 11 structures built on and beside a large rock. A two-storey building and its patio area adjacent to the rock (Plate V) were excavated in 1981 and in 1982 the INC discovered two fountain baths in a corner area. Here, as in the other small ceremonial site of *Huayna Quente* of slightly later date, the collection of finds dating from the Inca period is uncontaminated by earlier material fallen from the walls. In both cases the buildings selected for excavation were of the 'closed' type, as opposed to an 'open-fronted' structure. Trapezoidal doorways provide access into the 'closed type', and their domestic use was confirmed by the range of finds. Well-preserved levels of occupation have been found on both sites and activity zones are to be studied from the distribution of the artefacts in relation to the architecture. In *Huayna Quente* Building B.5 contained two remarkably well-preserved low platforms (Plate VI). Here the investigation, which produced a small amount of pottery, was extended to the adjacent buildings within the same group to make comparisons between the buildings and attempt a more detailed interpretation of the function of the group and varied activities represented in each structure. An 'open' structure in the shrine groups of each of these two ceremonial sites will be excavated.

Plate VI The earth platform at the eastern side of Building 5, Huayna Quente.

At *Quishuarpata* in a small complex of six Inca buildings, one building was excavated for comparison of its range and quality of artefacts with the other excavation sites of the Inca period. In this case, Late Intermediate period type material was mixed with that of the Inca occupation.

Excavations of the pre-Inca sites are being carried out in order to investigate and amplify the details of a sequence of occupations and associated pottery. Most of these sites are characteristic of the Late Intermediate period. However, the high incidence of sites which can be broadly grouped to fall within this occupation type, recognised by a predominance of circular structures and 'Killke-related' pottery (Kendall, 1976), suggests a development representing an occupation of considerable duration and complexity which could have begun before the accepted starting date of *c.* AD 1100 for the period. Here the lack of classic Middle Horizon material must be taken in consideration. Of particular interest for investigating this problem is the evidence of several phases of occupation in the abutting walls in the site of *Olleriayoc Leoniyoc* and the presence of pottery in wall mortar amongst these architectural remains. This site, which includes buildings of circular to oval form as well as some rectangular buildings, is under investigation by mapping and sample excavations. The full range of the site's chronology is still to be investigated and whether variations of house form from circular to oval are significant or not, has yet to be confirmed. However, at *Quishuarpata* the extensive Late Intermediate period site contains a high predominance of the circular to elliptical (or

Plate VII Excavation in a late pre-Inca type structure of oval form at Quishuarpata.

slightly oval) form and only four long oval structures. In 1981 the two types of structures, respectively circular and oval, were sampled by excavation but the preliminary analysis has revealed no temporal differences (Plates VII). Some unidentifiable buried sites observed on aerial photographs will be investigated in the final phase of the Project.

Finds and chronology

Processing and treatment of finds, supervised by Sara Lunt, has led to the cataloguing of more than 100,000 objects; these include pottery sherds, fragments of animal bone (some of them worked), human burials, obsidian flakes, stones and carved lithics, metal objects, shells, pigment remnants, plaster and mud bricks. The excavation strategy, which initially concentrated on the fort since it contains the whole gamut of occupations found throughout the region, has allowed us to retrieve a variety of pottery types dating from the different periods. However, some disturbance in the upper Inca levels by vegetation, precipitation and man or animal activity has been compounded by contamination caused by the decomposition of the plaster which covered the Inca walls and which contained pre-Inca material dating from several earlier periods. Now, through the diversification of the excavations over a variety of sites and Lunt's research to identify pottery by its fabric we are confident of having sufficient control to be able to refine the chronological data.

Generally, when the finds (including potsherds) are studied, we concentrate first on identification of the composition of the materials used in manufacture. Then we try to see how these could have been composed using locally available resources, by identifying local clays, pastes and tempers. Distinguishing between locally made and imported pottery is particularly appropriate in Cusichaca where there appears to be a large proportion of regional as well as some imported styles. This approach is being used because the attempts of archaeologists to establish a chronology at Cuzco often with insecure strata relationships and by means of seriation, have resulted in a great many uncertainties. Also the chronology itself which is rather broad, may not be applicable in detail elsewhere. For example, the Late Intermediate style, known as *Killke* at Cuzco (and referred to in its local manifestation at Cusichaca as 'Killke-related), is now thought to have continued in production locally during the Inca occupation, at least during Pachacutec's reign.

The approach of studying the pot manufacture and fabric led to hypotheses (put forward with Lunt in Kendall, 1979) which can now be substantiated by the results of Lunt's preliminary analysis. This shows that in the lower part of the Cusichaca valley area, during the Imperial Inca occupation:

1. Either some Inca wares were produced locally (example – Plate VIII) or are at least 'provincial' in the area.
2. There was at least one other local or nearby centre of production, originally pre-Inca, but which continued to produce a pre-Inca 'Killke-related' type of ware.
3. Classical Inca fine wares were present.

The preliminary analysis of the paste and of thin sections of Classical and Imperial Inca style sherds supports the view that this method can be more useful for identification than style/decoration. Some apparent variations of Imperial pottery wares which appear to

Plate VIII Example of an Inca period pedestal cooking pot.

predominate in other regions are confirmed by the specific tempers and clay types used in their composition (Lunt, 1982) and would seem to have been imported from various production centres.

During the pre-Inca periods, as during the Imperial Inca period, various contemporaneous groups stand out, marked by their paste and manufacture as much as by their shape and finish. However, there is more homogeneity in the contemporaneous pre-Inca pottery types of the two main periods represented at Cusichaca – the Early Horizon and the Late Intermediate periods. In contrast to later periods, the lower levels of the excavations contained few disturbed deposits and the associated pottery groups are being analysed initially using the same method.

Chanapata pottery predominates in the earliest levels under the Huillca Raccay fort site, while small amounts of Paqallamoqo pottery occur in the higher Chanapata levels of the 1975 excavation; most of the more recently excavated features under the later occupations are pits which contained fills. For this reason the opening of the court area adjacent to the well-stratified 1975 excavation is imperative.

Ceramic fabric groups, of which there are now 50, will form the basis of an analytical study involving chemical and physical tests in addition to thin sectioning. Having found that the material used in pot manufacture is specific to ceramic traditions, we feel confident that this analysis technique, when applied to material collected from good archaeological contexts, will lead to a greater refinement in the classification of each recognised type. We may succeed in respectively confirming and identifying the wares which up to now have eluded us and which correspond to the two periods we have been unable to distinguish in the region.

Because of the variety of types specific to each period found in the valley, we felt that a study of the production and distribution of pottery in the region at the present day might help our understanding of the overall pattern of pottery production in earlier times. The ethnographic study carried out has shown that today pottery is bought at artisanal fairs outside the area: Ancahuasi, Limatambo, Tiobamba, Maras, Cuzco and Tinta act as distribution centres for pottery made in Choquemarca (Limatambo), Racchi and Pucara. Each production centre seems to have its own speciality. It is therefore no surprise that there seems to have been a similar pattern in earlier times. Indeed the presence of obsidian implements and flakes, not indigenous to the region under investigation, is proof that exchange must have been practised over a wide area as far back as during the Formative period. Our ethnographic research work is continually being expanded and now includes a survey and collection of clay samples from the Cusichaca area and studies of pottery making techniques at the nearest local production centres.

Other artefacts

In more general terms the collection of artefacts is notable for great variety and varying quality. Many of the artefacts of Inca date seem to have been produced locally. Amongst the bronze objects there is a cast containing a high percentage of lead. The objects are being analysed in Cuzco but it is apparent to the naked eye that they contain varying quantities of lead, copper, silver and that presumably tin was contained in the alloy. No precious metals nor indeed any metal objects have yet been found in the stratified pre-Inca contexts, although one pin head from Group 1 is decorated in the 'Killke-related' style. However, at least the Incas must have exploited the mines in the region to supply their metal requirements.

At this stage, pending the results of further research, lithic and bone finds must pass without comment. There are some unusual pieces of sculpture which must be of local production. All that can be said about the osteological material is that examples of the expected range of local zoological species are represented in the different cultural complexes. Although camelids have now disappeared from the region, there is evidence to confirm their presence from the Early Horizon culture onwards. Herds of llama and alpaca must have been kept in the local puna (high altitude pastures) of the Salcantay and Sillque areas (there is also 18th-century archival evidence on the presence of alpacas). According to Dr E. Carrillo, the botanist questioned on this subject, this area still constitutes an ideal environment for camelids, especially for herds of vicuña.

Archival research

The main effort of this aspect of study undertaken by the author was carried out from 1978 to 1980, when data collected was largely limited to the late 17th century/ late 19th century. Recent research has yielded material on the 16th and 17th centuries, following up the work of Dunbar, Rostworowski and Glaves, which should throw light on the Inca period agricultural organisation of the area as well as on the formation of the 17th century hacienda at Sillque. Another source of useful local information on the late 19th century and the early to mid-20th century is Don Martin Escobedo who is reputed to be 102 years old and has been interviewed several times.

Ethnography

Partly to further our sensitivity in the identification of the ancient activity areas, their furniture and function, an independent ethnographic research of the region's houses and their contents, which was started in 1977, was extended in 1981 by Felicity Nock and is being completed this season. Houses are in many cases still constructed using very few new materials and maintain the custom of binding together the wooden framework with leather thongs or maguey thongs instead of using nails. Traditional features include the following:

One-roomed buildings, lofts (storerooms/deposits), niches serving as cupboards or beds of the cayuite type (2)

Clay-mud ovens

Lithics used for food preparation and clay pots are still included in the range of cooking utensils.

Clay pots such as large jars used for *chicha* (fermented maize beer) or as storage vessels.

Baskets – a full range of storage, containers and sieves.

In addition to these traditional features, there are also more modern ones. There has been a change recently in local house construction from stone walls and thatched roofs to adobe bricks and tin roofs and even, in two cases, to wattle and daub constructions. This illustrates the wide variety of choices available with the use of local materials.

The work is documented by drawing scale diagrams of houses showing the position of furniture as well as the distribution of household effects. These are also listed, as is any other relevant information, on a standardised questionnaire format. A record is made of local construction materials and types of local woods used, as well as tools used in the building work. A full range of agricultural tools and details concerning fabrication are also collected. A photographic record is made of each household and relevant implements and, where possible, a variety of representative items collected for the British Museum (1981) and Birmingham Museum (1982).

The type of ethnographic research being carried out is pertinent to the evaluation and interpretation of the results of the excavations. For example, observation and measurement of the uneven way in which the trodden earth floor surface in modern houses has worn away, leads to the estimation that areas of maximum wear may be worn by an average 0.5 cm per annum, the erosion being caused by frequent use and cleaning with a brush made of *retama* (brushwood). Sometimes occupants of a house may maintain the floor surface and level it as required with fill but this is by no means always the case. We noted that in the fort of Huillca Raccay, floor levels are lower in the centre and in the door threshold, both facts being consistent with ethnographic data. The same type of household erosion may explain the absence or bad preservation of prepared floor surfaces in the fort of Huillca Raccay, probably occupied for some 90 years. In the case of a well-preserved structure such as B.5 at Huayna Quente, with only one floor level, this kind of data can support the view that the site was of late date with brief duration of its original function. The amount of wear and its pattern may also indicate the type of activity a space may have been subjected to.

Another aspect of the ethnographic research which provides useful archaeological information is the study made of the quantity of pottery used in houses, together with its origins, Quechua name, distribution, function and duration. In one house it was interesting to note that an original Killke jar was being used anew to serve *chicha* (maize beer) to visitors. Other types of pottery such as jars used in *chicha* preparation may also last for decades whilst those of the style used mainly for cooking will have much shorter lifetimes, maybe no more than one or two years. Broken pottery is also re-used for a variety of different functions.

A contemporary lithic study is also being made for comparison purposes with the evidence of the prehistoric lithic industry, which is under study by Brian Bauer.

It must be said that the ethnographic research is carried out in full appreciation that this is no longer an area inhabited by a homogeneous community. Members of the eight local communities include some more recent immigrants from adjacent districts. However, the overall cohesive nature of the regional Quechuan traits provide a common background and exceptions can be assessed against recent outside contacts.

Environmental and economic research

The proposal to carry out research into environmental and economic conditions prevailing during at least 3,000 years of occupation in the Cusichaca region, was hindered in the Project's first two years (except in the case of soil and canal research) by factors ranging from changes in personnel to disturbed excavation and terrace levels. Recently, however, good progress has been made. Scientific methods used to investigate ancient environmental conditions are as follows:

1. Botanical, ethnobotanical and ethnographical studies.
2. Flotation and identification of seeds, carbon fragments and samples from excavated soils.

3. Phosphate analysis of excavated site and agricultural soils.
4. Phytolith analysis of ancient terraced and cultivated soils.
5. Study of pollen from a glacial deposit

1. Unfortunately pollen has not been preserved in the occupation levels and soils of the lower valley region although a probe was made of a deposit in the ancient glacial lake of the Quesca river valley, confluent of the Cusichaca river.

With the same objective in mind, there is much information to be gained from documentation of existing vegetation as well as use made by the local people of the great variety of plants. About 200 plants were collected and recorded and a note made of their uses according to information provided by local people. The plants fulfil a wide range of functions as construction material, tools, household implements, culinary and medicinal herbs, soaps or insecticides. Careful consideration of recent and present day uses may assist interpretation of the plant presence revealed in evidence provided by seeds and carbon samples found in the archaeological remains.

2. *The flotation method* has been used since 1979. The two separate manual and mechanical sieving processes have revealed the presence of carbon and some seeds. In 1981 more than 50 carbonised seeds were found in Pulpituyoc, mostly of maize and beans of the *Vicia faba* variety. Further samples of maize cobs were excavated from the Late Intermediate period site of Olleriayoc Leoniyoc in 1982. Next year the final stage of the Area 22 excavation of the Chanapata/Marcavalle occupations in the fort should provide a rich source of material.

Before any analysis or interpretation was possible, however, a reference collection of carbon samples, compiled from available Andean woods, was necessary and is now well advanced. A sample for carbonisation is taken of each of the local species, together with used fibres or splinters to show detailed structures. During the field season a comparative study of these and ancient samples is made in the University of Cuzco. It should be added that this particular type of research is far more valuable to the study of pre-Inca occupations than it is to the shallow levels of Inca occupation with their frequent contamination, except where the occupation was protected by greater depth.

3. *Phosphate analysis* to identify areas of concentration of organic material will continue. There are however the following problems to be contended with:

(a) The high proportion of phosphate indigenous to soils in the region.
(b) Contamination caused by agricultural burning of vegetation as well as by clearing of the archaeological sites themselves.

In 1980, in the chemistry laboratory of the University of San Antonio Abad of Cuzco, 2,000 soil samples were analysed, all taken from the fort of Huillca Raccay and corresponding to various periods of occupation. The results showed that some areas had higher concentrations than others. This method should be most useful in its current application at Patallacta, which is composed of groups of structures in which open corners are situated between buildings with access from but, quite well removed from, the

central patio. Concentrations found here would help to provide evidence for areas of organic rubbish, excrement and corrals.

4. *Phytolith analysis.* In 1980, given the limitations of research involving on the one hand study of pollen not preserved in the archaeological soils of the region, and on the other, the risk of exceeding our budget in the analysis of samples taken from a glacial lake, it was decided to assess the applicability of phytolith analysis to the region, phytoliths being far more resistent to environmental effects. Samples of soils taken from pre-Inca and Inca terraces and cultivated surfaces were examined by Natalia Lara for phytolith presence especially in pasture land and cultivated soils. A proper evaluation of this study will benefit from the formation of a comparative scale put together using a reference collection of identified cultivated lands for which there exist available sources of recent history. It is hoped that this method will enable us to find out which types of crops were grown on the terrace systems and high slope field systems. However, buried soils are crucial for the success of this approach since terraced soils contain a mixture of soils cultivated in preceding periods. The discovery of ancient soils found buried beneath Pulpituyoc and the Huillca Raccay terrace system may be of particular interest to this study.

5. A stratigraphical probe was made in 1981 of one side of the river Quesca canal. A similar probe attempted in 1978 into the Sisaypampa, upper Cusichaca, proved impossible when the hardness of the soil broke the instrument. Subsequently samples taken from the side of the Hatunpampa canal revealed pollen presence in the upper Cusichaca and encouraged the 1981 probe. It is hoped shortly to make a preliminary analysis of the samples taken.

Agricultural systems – land-use research

Apart from the classification and fertility soil studies carried out in 1978, other aspects of the environmental research include extension of the soil studies themselves to investigate terrace structures (Keeley), as well as a study of the high slope field systems.

The soil and terrace studies now show that 'artificial' soils were introduced to the Inca terraces and that these latter were of two types:

(a) Banks in the lower parts, having support walls in the wide natural river terraces.
(b) Totally constructed terraces with containing walls for fill and artificial soils.

The pre-Inca terrace systems can usually be easily distinguished from those of the Inca in that they are built of smaller stones and are of more modest proportions than those of the pre-Inca occupations. Excavation cuts have also provided evidence of modification and rehabilitation of some of the ancient pre-Inca terrace walls on the Huillca Raccay tableland. It is hoped to find a means of dating two phases of this system.

High slope field systems, situated on the valley slopes, account for a considerable land area (in the upper valley these exceed the terraces) and, as such, are of some importance to the agricultural history of the region. Since it is rare to find artefacts or other associated occupation evidence, or even datable canals by which to date these fields, their

role in the land-use system can only be evaluated in relation to the occupation patterns and density. They may be indicative of pressure on the land or simply of a pattern of land-use.

Work first concentrated on defining the systems distributed over the lower valley but has now extended to all parts of the drainage system, with documentation backed up by photographic record. The amount of sunlight falling on the different land-shapes is being measured to see if this was a significant factor in the distributive pattern. The study is complemented by current ethnographic and associated research carried out in the higher valley reaches. There have emerged two reasons for the cultivation of these fields:

(a) The pressure exerted on more accessible land.

(b) The desire to broaden the range of crops grown in the lower valley regions.

Canal systems. A variety of stone-lined canal systems which have been traced and recorded. Most of these can be dated by association with occupation sites. The study made of the canal systems has shown that like the Incas, the pre-Incas of the region (especially in the Late Intermediate period) were past masters in engineering and that the canal and terrace systems built during the Late Intermediate period were rehabilitated and consolidated in prehistory (see below). Thus a precedent exists for our *research programme of agricultural rehabilitation* of the region's canals.

Agricultural rehabilitation – canal restoration

The programme to investigate and implement rehabilitation of the prehistoric Quishuarpata canal and its terraces was started by the Cusichaca Project with financial backing from the Overseas Department Administration in 1978, as an integral part of the Project's work. In 1983, at the close of this programme, it is intended to have successfully rehabilitated a 5 km stretch of canal together with its distribution system, as well as 45 ha of ancient terracing.

The large-scale rehabilitation work on the abandoned Quishuarpata canal is being carried out in three stages:

1. The first stage which consisted of investigation, soil studies and canal and water sources, confirmed the technical feasibility of the scheme. Anthropological and sociological surveys also suggested that it could be a positive contribution to the economic development of the region.
2. The second stage, to implement rehabilitation of the canal and terraces of Quishuarpata (some 10 ha of land) was completed in 1981 after several critical sections of the canal were cleared and investigated as part of a hydraulic survey in 1980 (Plate IX).
3. The third stage, almost completed, is the continuation of the consolidation/restoration to the tableland of Huillca Raccay and its 35 ha in 1982. The latter two stages are being supervised by an irrigation engineer (Kees Stam) and an agronomist (Guido Huaman).

A fourth stage is desirable to develop the pilot scheme.

Plate IX A cleaned section of the Quishuarpata canal which originated in the Late pre-Inca period; with the site in the background, right.

Many aspects of the work and its documentation are complementary to the archaeological investigation. Thus the topographical survey of the terraces and field systems sets out to define:

(a) The ancient terraces which often appear as no more than steep banks.
(b) The distribution routes of the irrigation supply, essential information needed by the irrigation engineer responsible for the re-utilisation of the ancient systems or the redesign of water distribution over the surface of the tablelands and terraces.

In addition to topographical surveys, excavations were carried out to clear the banks and permit identification of several concealed terraces and assessment of their structual condition. These were the cuts previously referred to, which showed that some of the terraces had been modified and reconstructed in prehistory. It was also noted that the banks, which proved to be structurally sound, had an exaggerated angle of inclination due to the ancient practice of extending the original terracing in the following way: farmers clearing their cultivated fields of stones, would throw them to either side exactly as we did when we were preparing an experimental tract of land in 1980.

Parts of the Quishuarpata canal's two-drop structures were cleared and studied for their hydraulic qualities. In one place on the second drop structure, evidence was found of four construction periods in three reinforcements (by Ian Farrington). The water distribution system corresponding to one of these periods in Quishuarpata, and probably to another over the tableland of Huillca Raccay, is being investigated by means of regularly distributed clearing excavations which follow a network of stone-lined canal branches over each agricultural system. The system over the Huillca Raccay tableland is of unique interest and must have originated in the Late Intermediate period.

In line with the aims of the rehabilitation programme, a complementary agricultural and medical programme is promoting more protein concentrated crops and vegetable gardens such as *tarwi, quinoa* and *kiwincha,* in order to encourage an improvement in the local diet.

Reconnaissance and exploration

Reconnaissance under the supervision of the author and David Drew has added new data each year on the pre-Hispanic and modern occupation and communication systems of the area considered to be within and on the fringe of interaction with the Cusichaca drainage. The early stage of work concentrated on the immediate area of the valley itself with preliminary investigation of adjacent valleys and connections via the passes around Salcantay with Limatambo and Mollepata. Subsequently, the reconnaissance programme was extended to more remote regions having communication links with the Cusichaca valley, such as the Apurimac and Vilcabamba. The region of Ollantaytambo within the Patachancha valley has also been reconnoitred for comparison purposes.

Settlement patterns, similar in some cases, different in others, to those of the Inca and Late Intermediate period found in the Cusichaca valley, have been documented throughout the Aobamba, Sillque, Lucumayo and Santa Teresa valleys, as well as in valleys adjacent to the Apurimac and within the Vilcabamba itself. However, in general none of the major sites encountered in these areas showed evidence of the high degree of population concentration met with in the Cusichaca valley. On the other hand, the area of Ollantaytambo does supply evidence of high concentrations of these periods and a wider range of chronological phases clearly distinguished by their architectural remains, including the so-called Neo-Inca period. The latter is not exclusive to the Ollantaytambo area but other expressions of it are found, possibly in the Lucumayo and Santa Teresa valleys and Vilcabamba region.

The Inca architectural remains and the overall planning of sites along the communication systems therefore hold the key to the development phases of the Inca occupation of the area. This aspect of the work in combination with the ethnohistorical study, throws new light on factors which led to the founding and function of the important centre of Machu Picchu 30 km downstream from Cusichaca. Ethnohistorical sources provide evidence of pre-conquest accounts of the Inca conquest and some land-ownership/rights of the Inca rulers Pachacutec and Topa Inca and their *panaca* (Quechua term for Inca ruler's kin group).

In each valley studied, data support the vertical agro-ecological system proposed by Murra (1972). Further data are also provided of the complexity of valley and intermontaine communication systems at the Inca site level as well as for the contemporary occupation.

There is some evidence in support of independent and/or intercommunicating lateral connections and economic systems which cross others of the vertical systems, particularly in the case of long narrow valleys such as the Sillque and Santa Teresa valleys.

Conclusion

The preceding account of the progress of work at Cusichaca has included some discussion of how the objectives of the Project are being realised. Documentation of both the extensive Inca occupation as well as that of the Late Intermediate period, together with their associated terrace and canal systems, confirms that the area was one of intensive occupation and cultivation during both periods. The settlement pattern studies have been virtually completed for the immediate area as well as in adjacent valley systems, although the dating of some sites is still in question. It is not within the scope of this work to expand further upon the results of the excavations at this stage, which depend on further analysis and collation of a variety of relevant data.

Some more detailed archaeological results which are basic to the interpretation on settlement patterns, excavations and pottery analysis, are being prepared and summarised in several individual interim papers by Kendall, Drew, Hey, and Lunt, for publication by BAR. Unquantified observations can be made about the distribution of artefacts.

The quantity and range of Inca types is very similar at the Inca sites excavated but each assemblage is different. Pottery in the other periods is more homogeneous. With reference to the gaps in our chronology, it would seem inconceivable that with such a distinctive Early Horizon occupation and such intensive Late Intermediate period agricultural settlement, that there should not have been a continuous occupation of the area. It is possible that these could be represented by an Early Horizon style which continued into the Early Intermediate. In the case of the Middle Horizon, this period may not be represented locally by the classical Huari style. It is also important to date the first appearance of the 'Killke-related' style of pottery and its possible variations of types.

The overall aim, to gain a well-illustrated view of the development and functioning of a pre-Hispanic agricultural system with its accompanying rural origins, has not yet been completed but a wealth of data has been amassed to this end. It is already possible, combining the data obtained in the archives on the distribution of properties, products land-use and irrigation, and demography in the region of Ollantaytambo and Machu Picchu, with ethnographic and archaeological data, to show which were and may still be the critical requirements for the success of agriculture in colonial and republican times. In order to achieve a high yield of maize, the prime crop of the region, the crop requires a higher proportion of manual work and capital investment than other crops cultivated in the region. The capital investment is seen in terms of a controlling administrative group and subsidy of the work costs directly in cash or indirectly in work implements, food and redistribution costs.

Since the region is ideal for the production of maize and the Incas depended on its cultivation for feeding and maintaining their administrative and military classes, their terraces and canals were built for maize production. Peoples were required to build and maintain the agricultural systems for the high level of production and there must have been a continuous spiral of agricultural development and growth in maize production areas with, in turn, increases in population during the Inca period. This spiral must have begun earlier but it is still too soon to put a date on it in this region.

While the above supports the original premise of the Project that the Cusichaca complex comprised an agricultural development scheme in the Inca period, whose centralised administration extended and improved earlier systems, it also provides some insights for appraising agricultural rehabilitation and redevelopment of past systems which seems worth expressing here in relation to the anthropological implications arising from the overall work of the Project.

The decline of the system in the 16th century and more recently in the 19th and 20th centuries, is due to the reduction of population in the region, caused by displacement, plagues and wars and the lack of a sufficiently well-organised and powerfully homogeneous administration. This reduction of population with its accompanying loss of capital investment in terms of manual work and maintenance of the systems inevitably caused the upward spiral to reverse into a long period of decline.

The implications for successful agricultural rehabilitation are clear but the problem remains of how to reverse the downwards spiral. The two essential elements for imple-

menting a rehabilitation scheme are the technical ability combined with a favourable social climate and capacity for reconstruction. The question we are faced with at Cusichaca is whether the technical aid is sufficient to turn the spiral and provide the initial stimulus for improving the in-put. This line of questioning was developed in a paper given at the meeting of the Archaeological Association of America in December 1982.

If we look again at Inca organisation, we should note that the administration provided an infrastructure which was supposed to guarantee certain standards of livelihood, as well as satisfying religious and community life. Can the same be said about rural conditions in most of the Andes today? Certainly these conditions do not exist at Cusichaca and it has therefore been one of the secondary aims of the Project to try to stimulate interest in education, health, hygiene and a higher standard of living which, with the sale of local produce, could become available to local families and without which they will continue to abandon rural life for the lure of Western goods in the towns. A first step in this direction would be a village focus for the community.

The rehabilitation programme at Cusichaca was not equipped to carry out a full-scale effort on the infrastructure of the community for three reasons: it would be seen as political interference; the cost of the specialised personnel would be high; and it would be difficult to justify in terms of an archaeological project. Although we were aware of these limitations, the scheme went forward because Cusichaca offered a showcase example of what could be done technically and at a low cost. There are also possible spin-offs for the tourist industry if the complete length of the canal is rehabilitated to reach the major site of Patallacta. An additional reason in this case was the Project's wish to make a contribution as a gesture of appreciation to its hosts, by attempting to bring better living conditions into a depressed rural community, already having to face the onslaught of Western influence before the Project began.

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Abstract

This report summarises the progress of the various aspects of the fieldwork in which the Project is engaged and attempts to evaluate its achievement so far.

The excavation strategy which first concentrated on one multi-period site *c.* 500 BC–AD 1534, has now diversified to various other sites of the Inca complex and of the Late Intermediate period and their accompanying canal and terrace systems.

Archival investigation has laid the foundation for post-conquest studies, while ethnographic and environmental studies have contributed to both the archaeological and rehabilitation aims of the project.

Reconnaissance trips have added new data to knowledge of the pre-Hispanic occupation and communication systems of the area, revealing a complexity of valley and intermontaine communication routes and permitting a reappraisal of the relationship between Cusichaca and Machu Picchu.

There is archaeological evidence for the rehabilitation and modification of the canal and terrace systems built during the Late Intermediate period, showing that there is a precedent for the present rehabilitation of the Quishuarpata canal and its adjacent field systems. Major sections of the canal restoration have now been carried out, revealing a complex prehistoric water distribution system.

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Rescue Archaeology in Sussex 1982: A Ninth Progress Report on the Sussex Archaeological Field Unit

by OWEN BEDWIN (ED.), CAROLINE CARTWRIGHT, PETER DREWETT and DAVID RUDLING

Introduction (Fig. 1)

The research framework within which SAFU operated in 1982/3 was defined by the following five projects:

1. *The coastal plain project*

A study of the settlement, economy and environment from *c.* 1000 BC to the end of the Roman period on the West Sussex Coastal Plain. There were two excavations of Roman sites within this project, at Goring and at Copse Farm, Oving. There was also a survey of sites along the Chichester harbour coastline.

2. *Selsey Iron Age project*

A study of the putative late Iron Age tribal capital at Selsey, along with its defensive 'outworks', the Chichester dykes. The excavation at Ounces Barn, Boxgrove, examined the eastern end of the dyke system, plus a contiguous Romano-British farmstead.

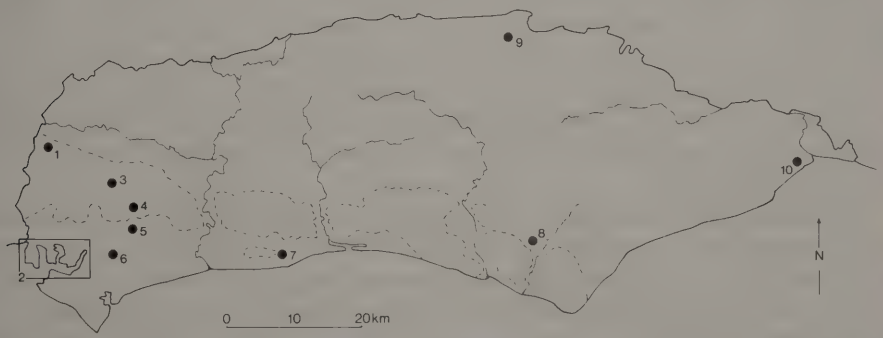

Fig. 1 Projects undertaken by the Sussex Archaeological Field Unit in 1982. 1, North Marden; 2, Chichester harbour; 3, Court Hill; 4, Halnaker Hill; 5, Ounces Barn, Boxgrove; 6, Copse Farm, Oving; 7, Goring; 8, Selmeston; 9, Hartfield; 10, Winchelsea.

3. *Plough damage assessment*

There were three sites in this category; the long barrow at North Marden, the hill-top enclosure on Court Hill, Singleton, and an oval barrow and field system on Halnaker Hill. (This last was funded by the Sussex Archaeological Society's Margary Fund.)

4. *Origin of small towns*

There were further excavations in Edward I's planned town of New Winchelsea (including part of a medieval cemetery), and a survey of the surviving town gates.

5. *Cuckmere valley project*

A multi-period survey of the archaeological development of this river valley in East Sussex. There was a single excavation at Selmeston, plus a programme of field walking over the winter months 1982/83, to locate new sites.

There were changes in the Unit's personnel. Peter Drewett, the Unit's Field Director from its inception in 1974, resigned to become a full-time lecturer at the Institute of Archaeology as from 1 October 1982. Owen Bedwin took over as Field Director. Two recent Institute of Archaeology graduates were employed on short-term contracts; Paul Garwood, to carry out the fieldwalking programme in the Cuckmere valley mentioned above, and Sue Browne, to prepare the Bullock Down archive, following the completion of the five-year multi-period study of the archaeology of Bullock Down, Eastbourne. This project was published by the Sussex Archaeological Society as a monograph, and appeared in December 1982.

I. The excavation of an oval barrow at North Marden, West Sussex

by PETER DREWETT

The oval barrow at North Marden was located by Mr F. G. Aldsworth on an air photograph taken by the Royal Commission on Historical Monuments in 1976 (SU 8015/365). The primary purpose of this excavation was to date and provide an environmental context for a second monument of this type in Sussex. The total excavation of the Alfriston oval barrow suggested a late date in the long barrow building tradition (Drewett, 1975a) and its construction in an area that had been cleared well before the building of the barrow.

The whole of the excavation was undertaken by hand. The area of the mound was totally excavated and extensive areas of the ditch were sampled (Fig. 2). No traces of any structures or burials were found in the area enclosed by the ditches (Plate I). The actual mound itself had been totally ploughed away. The ditch system consisted of two main flanking ditches, one on the north side and one on the south side of the barrow. These ditches were over 2 m deep in places (Plate II). At each end were shallower detached pits.

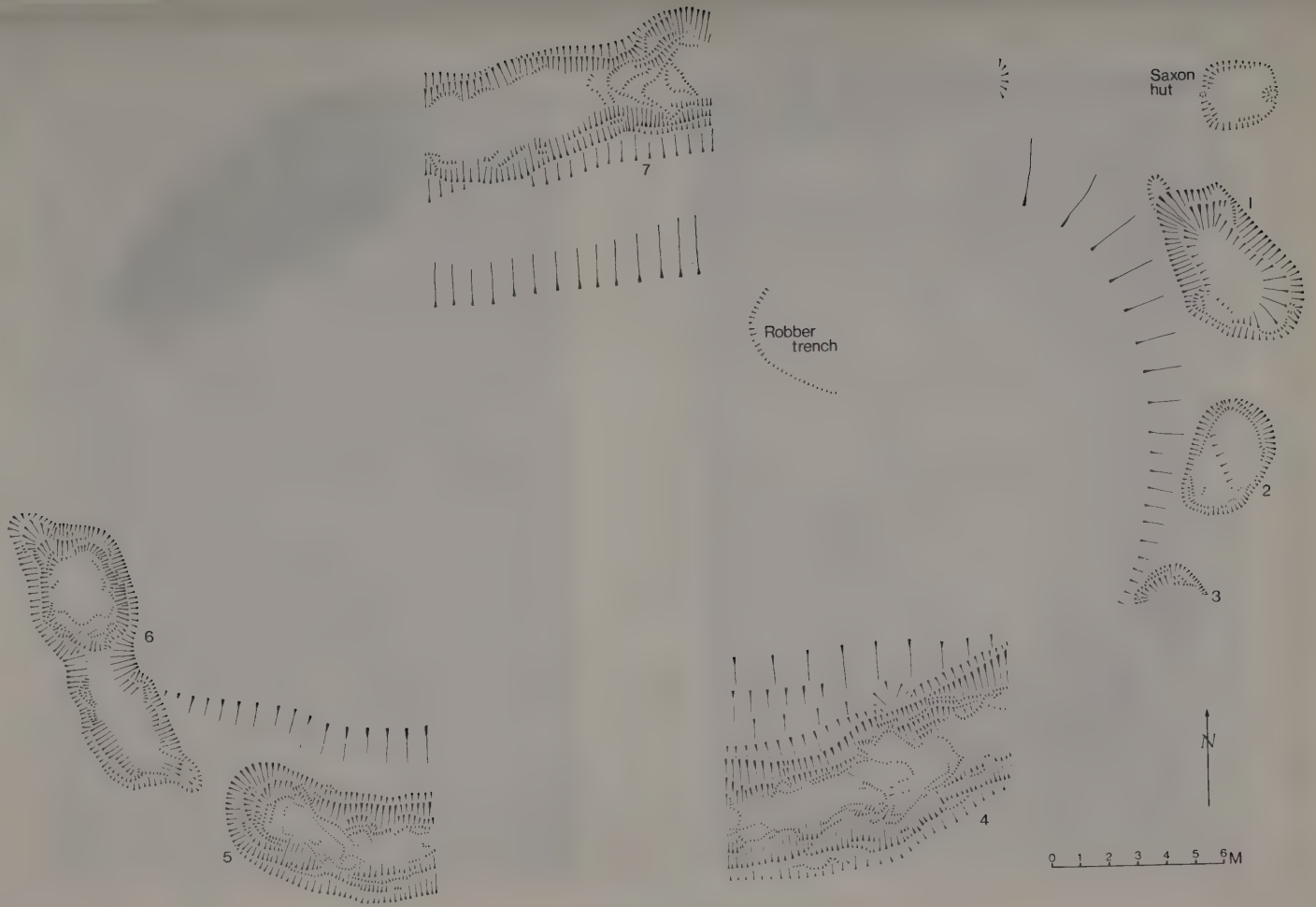

Fig. 2 North Marden. Excavation plan.

Plate I North Marden. General view of the excavation.

Plate II North Marden. Section across flanking ditch. Scale 2 m.

The main flanking ditches were irregularly pit dug. The primary chalk rubble in these ditches indicates rapid natural erosion of the ditch edges. Few artefacts were found in these deposits. Flint flakes, including clusters, indicated some flint knapping of nodules probably located while digging the ditches. A few broken antler tines were also found. Finer silts above the primary chalk rubble suggest more gradual silting under grass cover. Beaker material including a hearth, was found in these layers. Above these were plough soil horizons with many abraded sherds of pre-Roman Iron Age and Romano-British pottery.

The detached ditch segments at the west and east end of the mound showed a more complex picture of infilling. Segment 1 (Fig. 2) appears to have naturally silted in, but segments 2 and 3 indicate deliberate backfilling. A fine soil horizon both on the bottom and up the sides of the ditch suggests a turf lining. Into this had been dumped large chalk blocks including a well carved notched block and one drilled with holes.

At the western end of the mound, ditch segment 6 had clearly been dug in two phases with the deeper northern pit cutting through the silts of the shallower southern pit. This deeper pit also showed some evidence of deliberate backfilling, with a human cranium being deposited with charcoal and pottery in the bottom of the ditch.

The only later structure found during the excavation was a small Saxon sunken hut to the north-east of the barrow (Fig. 2). It was dug into the chalk bedrock and had the characteristic large post-hole at each end. Several stake-holes were located within the hut. Two spindle whorls, a whetstone and a few sherds of Saxon pottery were found on the hut floor.

II. Field survey of Chichester harbour, West Sussex

by CAROLINE CARTWRIGHT

During August 1982, a field survey of Chichester harbour was undertaken by the writer and five students, in order to collect and analyse material (particularly the Neolithic and Bronze Age flint concentrations) exposed by continual coastal erosion of the low cliff lines.

Over a 10-day period the coastline was systematically fieldwalked from West Wittering to the western side of Thorney Island near Emsworth. (Some stretches of coastline were examined more than once to eliminate misleading results introduced by extreme tidal variations.) Seventy-two concentrations of material were located during the field survey – mostly flint (waste material, tools – especially scrapers, and fire-cracked fragments). Pottery was also recovered; largely Iron Age and Romano-British.

The earlier flintwork and the later material (including that associated with known salt-working sites) recorded, will contribute to a more detailed assessment of salt marsh resource utilisation in the Chichester harbour area in the wider context of the Coastal Plain beyond.

III. Excavations on Court Hill, East Dean, West Sussex

by OWEN BEDWIN

The feeble enclosure on Court Hill was first recorded by Eric Holden (1951), along with a number of other features, notably a crescent shaped earthwork to the north (Fig. 3), some small barrows, and further to the north-west, an extensive field system.

The enclosure itself is an irregular circle, up to 175 m across, with an easy approach from the east, but steep slopes on the other three sides. There is no obvious entrance into the enclosure; only the stretch in the woodland (Fig. 3) survives as an earthwork but has no gap. On aerial photographs, the bank appears to be continuous, though there are

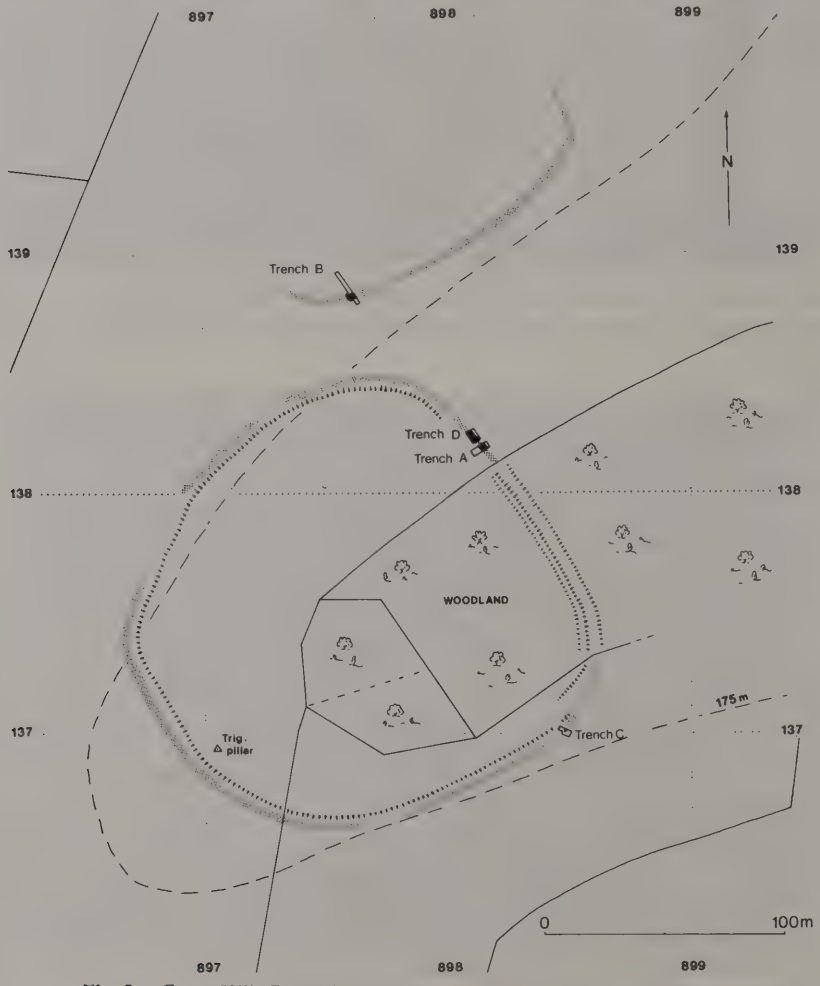

Fig. 3 Court Hill. General site plan (from survey by F. G. Aldsworth)

some gaps in the ditch (reflected in the plan, Fig. 3). Apart from the wooded area, the enclosure and the crescent-shaped earthwork are both heavily ploughed, and it was therefore decided to carry out sample excavation in September 1982 to ascertain the extent of plough damage and to date the enclosure.

Three trial trenches were cut across the ditch. Trenches A and D revealed a flat-bottomed ditch, *c.* 1 m deep, with no sign of a re-cut (Fig. 4). Trench A was extended

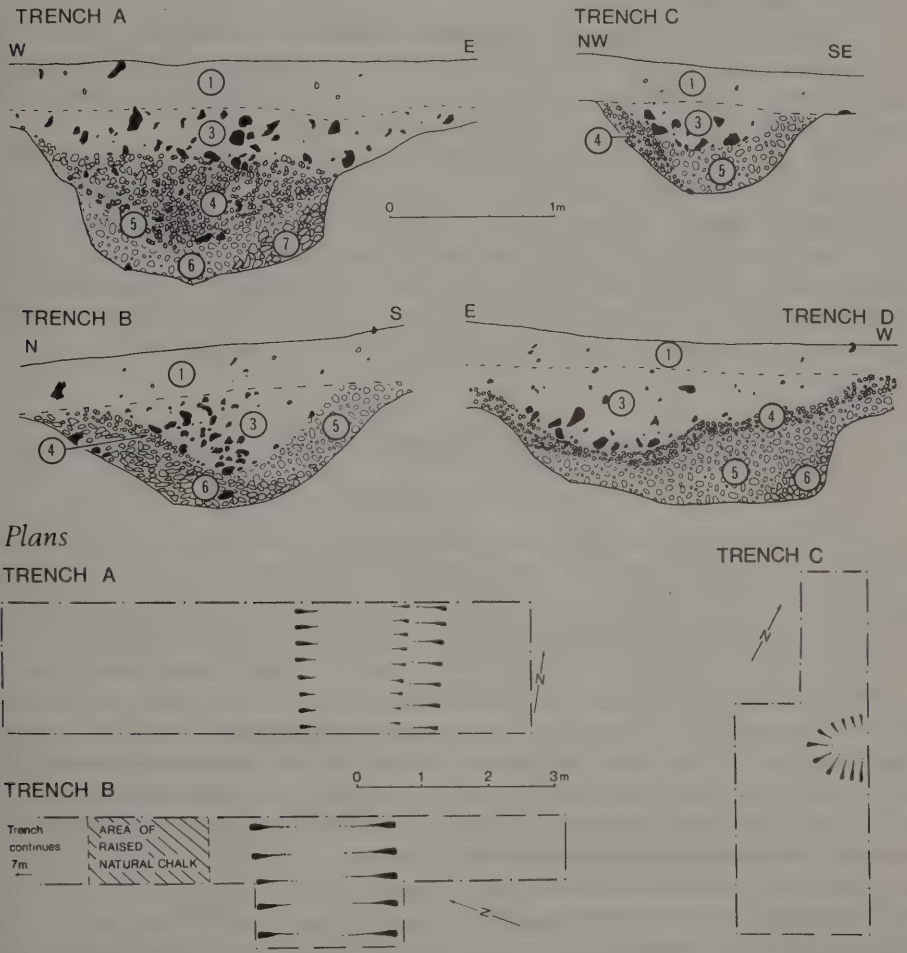

Fig. 4 Court Hill. Detailed plans and sections. Key to layers – Trench A: 1, Modern ploughsoil. 3, Flint nodules in dark brown soil matrix. 4, Gritty fill of small weathered chalk bits in dark brown soil matrix. 5, Slightly weathered medium chalk chips in mid-brown soil matrix. 6, Slightly weathered medium/large chalk chips in buff soil matrix. 7, Loose unweathered chalk rubble in white soil matrix. Trench B: 1, 3, 4, as A1, 3, 4; 5, Loose gritty weathered chalk in buff-brown soil matrix. 6, Loose unweathered chalk chips in white soil matrix. Trench C: 1, 3, 4, as A1, 3, 4; 5, as A6.

to take in the area of the enclosure bank, but, not unexpectedly, no bank material survived; there was merely a slight rise in the natural chalk. There was no indication of any revetting for the bank (e.g. post-holes). Conclusive dating evidence was lacking; few finds were made. There were some flint flakes and a few scraps of undiagnostic flint-gritted pottery, but there was just sufficient animal bone from the ditch floor in trench D for a carbon-14 date to be obtainable. Trench C revealed a small ditch terminal, only 0.5 m deep, with no finds.

Trench D was cut through the unusual crescent-shaped earthwork to the north of the enclosure (Fig. 3). A ditch similar in profile and silting sequence to the enclosure ditch was found, but there was no dating evidence. Again, evidence for the former presence of a bank survived only as a faint rise in the chalk bedrock.

When the earthworks on Court Hill were first discovered (Holden, 1951), an 'occupation site' was described, lying to the north of the enclosure, and bounded on its west by the crescent-shaped earthwork. This site was characterised by many irregular depressions, concentrations of burnt flint, and some sherds of flint-gritted pottery. In 1982, after 30 years' ploughing, this 'occupation site' was no longer discernible; there were no depressions, no concentrations of burnt flint and virtually no pottery. This strongly suggests that a particularly interesting area has been totally destroyed.

IV. Excavations on Halnaker Hill, Boxgrove, West Sussex (second season)

by OWEN BEDWIN

In 1981, sample excavations of the hill-top enclosure on Halnaker Hill were carried out (Bedwin, 1982a). Sixty per cent of this feeble enclosure is ploughed annually, and dating the site was felt to be of some importance, especially in view of its similarity to the early Neolithic enclosure on Bury Hill, 10 km to the north-west (Fig. 5). The 1981 excavation (Trenches A and B in Fig. 6) did not provide straightforward results, however; although one of the ditch terminals was exposed, and was shown to have the 'linked pit' appearance typical of the early Neolithic, artefacts were few and varied from Neolithic (early and late) to Iron Age and Romano-British, with no reliable stratigraphic separation. Animal bone from near (though not on) the ditch floor yielded a carbon-14 date of 850 ± 90 bc, i.e. in the later Bronze Age. Further excavation will obviously be necessary to resolve this apparent conflicting evidence.

However, the enclosure on top of Halnaker Hill, whether Neolithic or Bronze Age, is only one of a number of earthworks in the area (Fig. 6), and in 1982 further sample excavation of these were undertaken (Trenches C–E), again with the financial support of the Sussex Archaeological Society Margary Fund.

Trench C was intended to sample the flanking ditch of a small oval barrow much reduced by ploughing. The subsoil here was clay-with-flints, overlying chalk. The ditch was 2.0 m deep with a narrow bottom (Fig. 7), and although no finds were made, the barrow is presumably Neolithic.

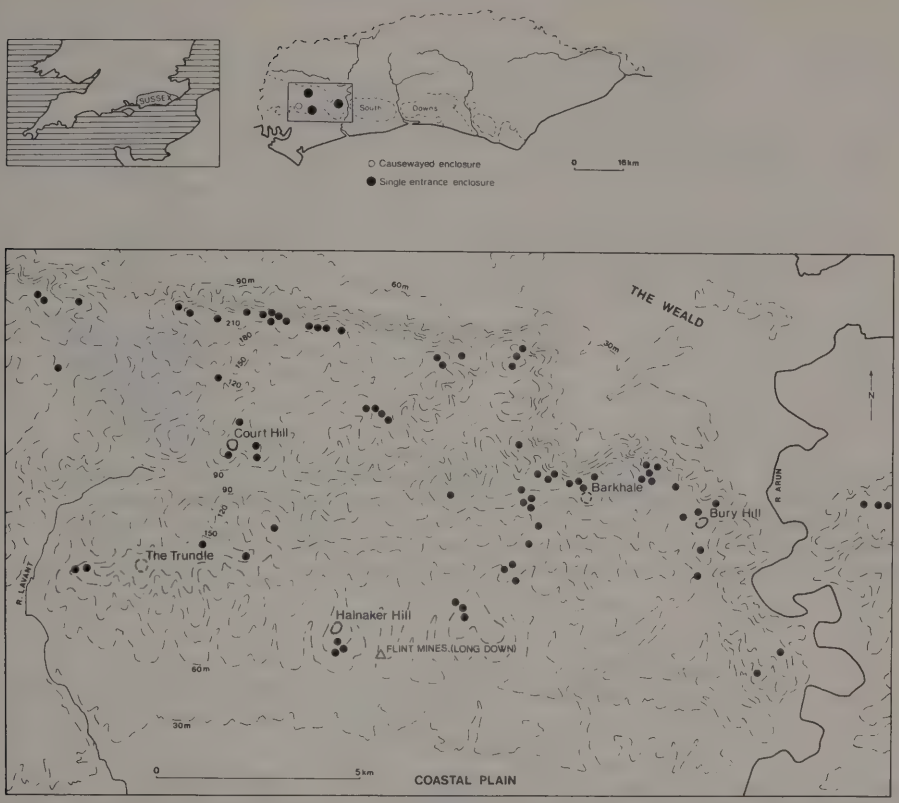

Fig. 5 Distribution map of early Neolithic enclosures and undated enclosures on the South Downs in West Sussex (by F. G. Aldsworth).

The purpose of Trench D was to date one of the more prominent lynchets of the field system on the southern slope of the hill. A slot 15 m long by 1 m wide was cut through the lynchet at right angles to it; the eastern section was then drawn and the lynchet build-up (layer 2 in Fig. 7) was carefully cut back by trowelling, each artefact being plotted on to the drawn section. A total of 66 artefacts was found; 17 potsherds and 49 flint flakes. The pottery was flint-gritted, some sherds very heavily, others less so, but the general date range for this material cannot be defined more precisely than Late Bronze Age/early Iron Age. (One of the sherds seemed to have traces of a haematite coating.)

Finally, Trench E was cut through the centre of what appeared to be a small round barrow (much truncated by ploughing) on top of the corner of a field. There was a faint suggestion in section of an almost destroyed ditch running round the mound, but there was no definite evidence as to its date.

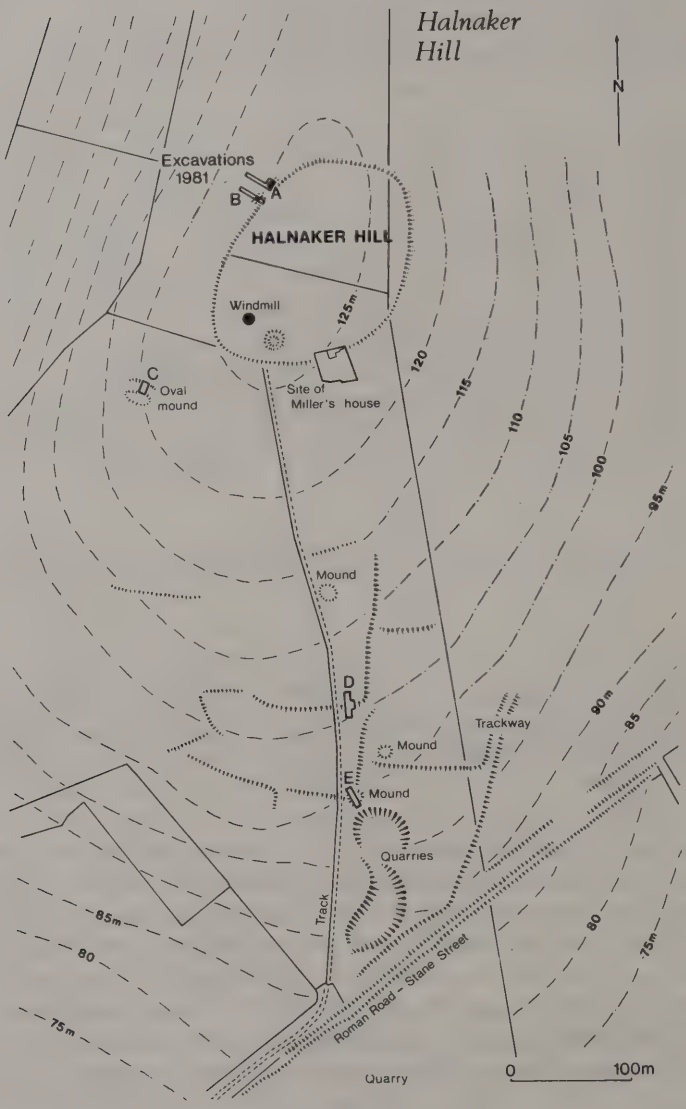

Fig. 6 Halnaker Hill. General plan of earthworks and trenches (from survey by F. G. Aldsworth).

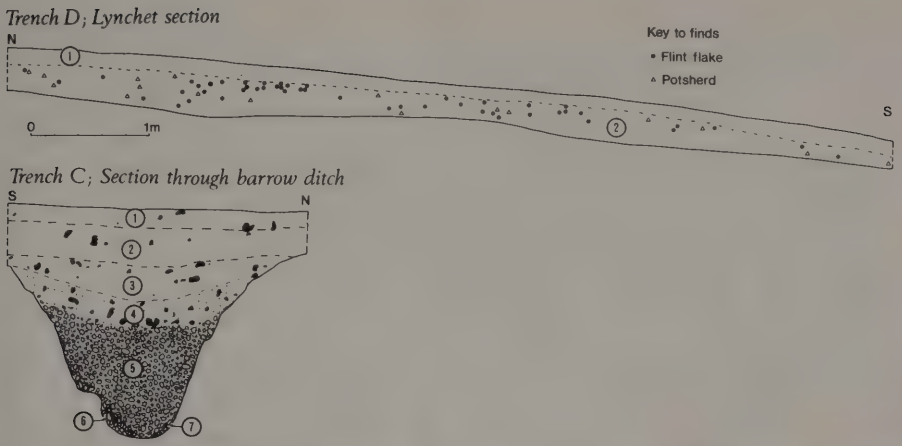

Fig. 7 Halnaker Hill. Sections Key to layers – Trench D: 1, Modern ploughsoil. 2, Homogeneous soft clayey brown lynchet build-up. Trench C: 1, Modern ploughsoil. 2, Sub-ploughsoil layer, similar to 1, though slightly less humic. 3, Sticky brown clayey fill with no chalk bits. 4, as 3, but with some chalk bits and many flint nodules. 5, Loose yellowish chalk blocks in sparse matrix of yellow brown clay. 6, 7, Loose unweathered chalk slabs in fine white matrix.

V. Excavations at Ounces Barn, Boxgrove, West Sussex

by OWEN BEDWIN

In 1981, Mr G. Udell, the foreman of Amey Roadstone's Earthman pit, noticed a rectilinear ditch which had been exposed by gravel quarrying; from the ditch fill came Romano-British pottery, burnt flint and charcoal (Fig. 8; 'Ditch 1981'). This discovery was reported to F. G. Aldsworth, County Archaeological Officer for West Sussex, who in turn informed the Sussex Archaeological Field Unit. In view of the imminent threat to the site, it was decided to strip the topsoil over a large area, from the Roman ditch westward to the eastern end of the Devil's Ditch (part of the Chichester Dykes complex; Fig. 8). This revealed part of a substantial Romano-British farmstead, which was excavated from June to September 1982.

The site lies on a gentle south-facing slope; the subsoil is gravel, with a variable amount of reddish-brown clay. Less than 500 m to the north, however, the subsoil changes to the chalk of the South Downs. Also within 500 m is Stane Street, the Roman road running north-west from Chichester (Fig. 8). The quarry is already known for its Palaeolithic material (Woodcock, 1981), and for a find of Iron Age saucepan pottery made in 1976 (Bedwin and Pitts, 1978; Gazetteer site 10).

Four general episodes of activity on the site were distinguished:

1. There was a ubiquitous spread of worked flint, mostly in the topsoil. The majority of the pieces were either waste flakes or scrapers, but one barbed-and-tanged

Fig. 8 Ounces Barn, Boxgrove. Site location (by F. G. Aldsworth).

Fig. 9 Ounces Barn, Boxgrove. General site plan (by F. G. Aldsworth).

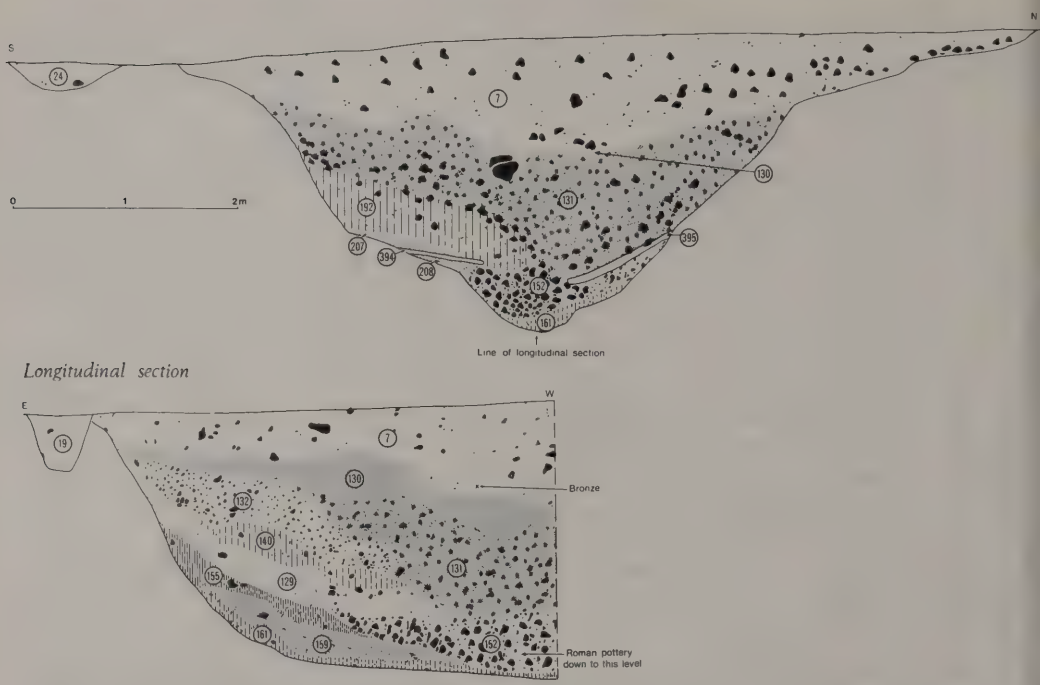

Fig. 10 Ounces Barn, Boxgrove. Transverse and longitudinal section of the Devil's Ditch terminal. Key to layers: 7, Hard packed brown clayey fill. 19, Compact brown homogeneous fill. 24, Compact dark brown homogeneous fill. 129, 131, Softish grey-brown clayey fill. 130, Hard compact gritty orange-brown fill. 132, Hard compact orange clayey fill. 152, Hard stony brown clayey fill, 155, Compact gritty yellow-brown clayey fill. 159, Hard gritty brown clayey fill. 161, Compact layer with many small flint grits in yellow-brown clay matrix. 192, Compact grey-brown clayey fill. 207, Softish dark grey clayey fill with few stones. 208, Hard sticky light brown clayey fill. 394, 395, Fine brown clayey fill (? weathered/washed-in subsoil).

arrowhead was also found. If this single diagnostic implement is contemporary with the remainder of the flintwork, it would suggest hunting activities in the area (rather than settlement) during the Beaker period.

2. The construction of the Devil's Ditch (Figs. 9 and 10). The eastern terminal of this stretch of the Chichester dykes (known locally as the Devil's Ditch) was excavated, revealing a V-shaped profile, 2.6 m deep. All the silting layers within the ditch contained Roman pottery, though there was none from the ditch floor itself. The pottery from the earlier silts dates to very early in the Roman period (including early samian forms). The building of this end of the Chichester Dykes system was therefore probably very late in the Iron Age, as other authors have suggested (Murray, 1956; Bradley, 1971). The excavated evidence from this ditch terminal contrasts with that obtained in 1981 from a section 1 km to the west, in Halnaker village, where the ditch was only 1.6 m deep

with a wide, flat bottom, and contained much late medieval pottery (Fig. 10 and Bedwin, 1982b).

3. The majority of the features on the site, ditches, gullies, pits and post-holes, belong to the Romano-British settlement. Within this major episode, at least two phases are discernible. The first, very early in the Roman period, consists of two substantial ditches, 27 and 284, running north–south, both with a sharp V-profile suggesting a military nature. To the second phase, all the other features belong, i.e. the trackway, the three-sided enclosure 110, the ditch 37, which was built so as to drain into the then still open Devil's Ditch, and also some extensive patches of flint cobbling at the eastern end of the excavated area (for the sake of clarity these have been omitted from Fig. 9). Most of the diagnostic pottery belongs to the 1st and 2nd centuries AD, and suggests a farm settlement here succeeding brief military use of the site. Among the small finds were an intaglio, some fragments of bronze fibulae, a small intact crucible with a residue of bronze slag inside, large numbers of sandstone quern fragments, and some pieces of coin moulds. These latter, of Iron Age type, are the first of their kind to be found in Sussex, and came from the backfill of one of the military ditches, 284. This find inevitably raises questions about the status of the site; the presence of such moulds presumably indicates the production of coins on the site, but was this before AD 43, or after, under the jurisdiction of a client king?

The economic basis of the settlement is presumably agricultural, with surplus produce being sold at local markets, e.g. Chichester. Precise details of the economy are incomplete; the acid subsoil has meant that little bone has survived, and the carbonised grain isolated by flotation has yet to be identified.

4. In the 14th/15th centuries, the two parallel gullies, 23 and 77, were constructed. Interpretation of these shallow features is difficult; however, there were a number of contemporary features revealed in trial trench 1 to the south of the main excavated area, and it is possible that all relate to a late medieval farmstead in the vicinity.

VI. Further investigations of a Roman Villa at Goring, West Sussex

by D. R. RUDLING

In advance of the next phase of building work a limited excavation was undertaken at Worthing College in order to further investigate the small corridor villa discovered there by members of the Worthing Archaeological Society during an initial phase of development in 1978 (Fig. 11). Although the main excavation slightly overlapped on to the area previously exposed, it was primarily concerned with revealing the northern end of the villa (Plate III). The villa plan thus obtained consists of a central range of three rooms (each approximately 5 m square), flanked on all sides by corridors which had been subdivided to make a number of smaller rooms. The main wall footings were of flint, but two of the corridor internal subdivision footings were made of chalk. The foundations of the central range of rooms were up to 50 cm deep, while those

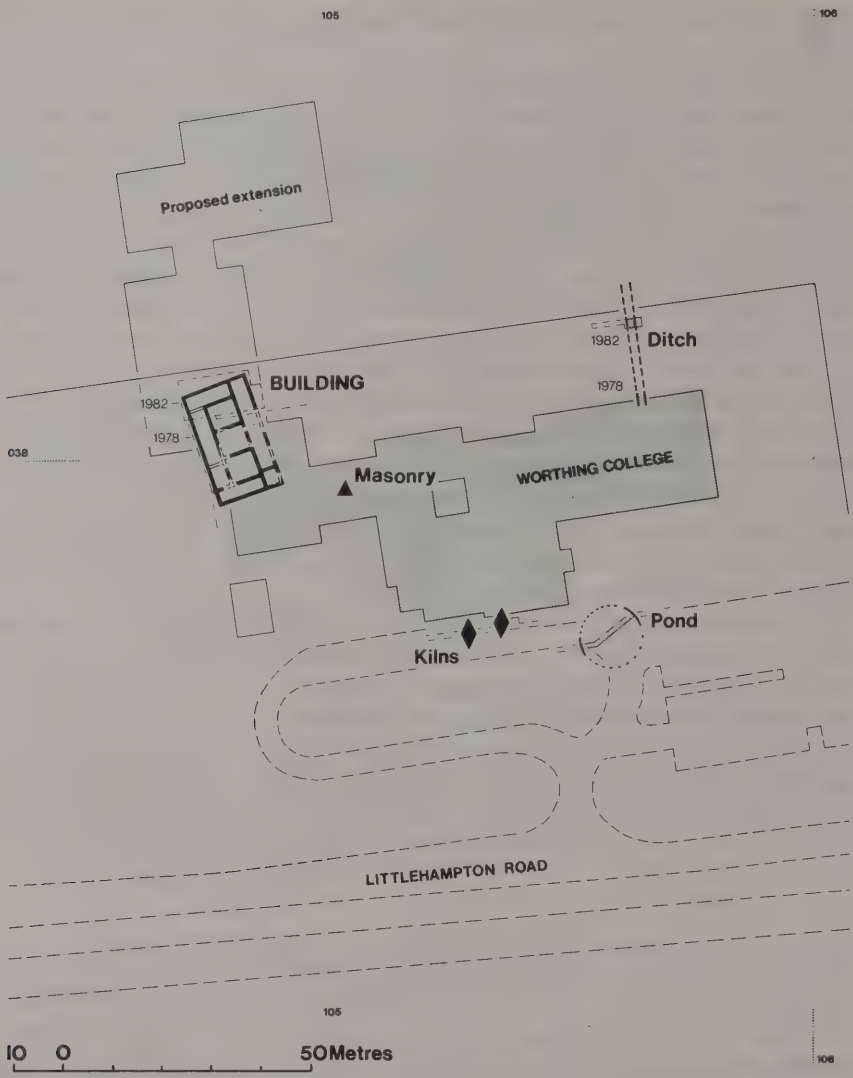

Fig. 11 Goring Roman villa. General plan showing trenches and various observations made in 1978.

of the surrounding 'corridors' were not more than 20 cm deep. The discovery of tesserae indicates at least one type of flooring used in the villa, but unfortunately none was found *in situ* since the floor levels themselves had been destroyed by ploughing. There were very few finds, but the pottery indicates occupation on the site during the 2nd and 3rd centuries. No evidence of any earlier structures were discovered on the site of the villa.

In addition to the excavations outlined above the opportunity was taken to further

Plate III Goring Roman villa, Wall footings of the northern end of the villa. Scale 2m.

study a Roman ditch which was first found in 1978 to the east of the villa (Fig. 11). The ditch, which is approximately 'V'-shaped, was located and sectioned and yielded a piece of samian ware from near the bottom and a coin of Carausius (287–93) from the top. In addition to other pieces of pottery the ditch also contained daub, extremely poorly preserved animal bones and fire-cracked flints, especially from the uppermost fill. This occurrence of large quantities of fire-cracked flint in the top of the ditch may be useful for tracing the rest of the feature, if so the results of systematic fieldwalking by the Worthing Archaeological Society in the field immediately to the north of the ditch section excavated in 1982 suggest that the ditch may continue in a straight line for quite some distance northwards. The ditch was most probably dug for drainage purposes, but could also mark the eastern boundary of the Roman farmyard (note that in 1978 other masonry, kilns (? corn-drying ovens) and a pond were all found to the east of the villa building – see Fig. 11). In addition to the ditch, Trench 2 also revealed a couple of small pits containing pre-Roman Iron Age pottery, thus indicating earlier occupation in the vicinity of the Roman villa.

VII. Excavations at Copse Farm, Oving, West Sussex (second season)

by OWEN BEDWIN

In 1979, a series of crop-marks was discovered on aerial photographs of Copse Farm, just east of Chichester. These crop-marks, all of which correspond to ditches, took

Fig. 12 Copse Farm, Oving. General plan of cropmarks (by F. G. Aldsworth).

the form of three enclosure complexes linked by double-ditched trackways (Fig. 12). A first season of excavation in 1980 concentrated on one of these enclosures, measuring 30 m by 25 m, which turned out to be part of a late Iron Age settlement (Fig. 12 and Bedwin, 1981).

In August 1982, one of three adjacent enclosures was totally excavated (Fig. 13, Trench E). The ploughsoil in this area contained much Romano-British pottery, and

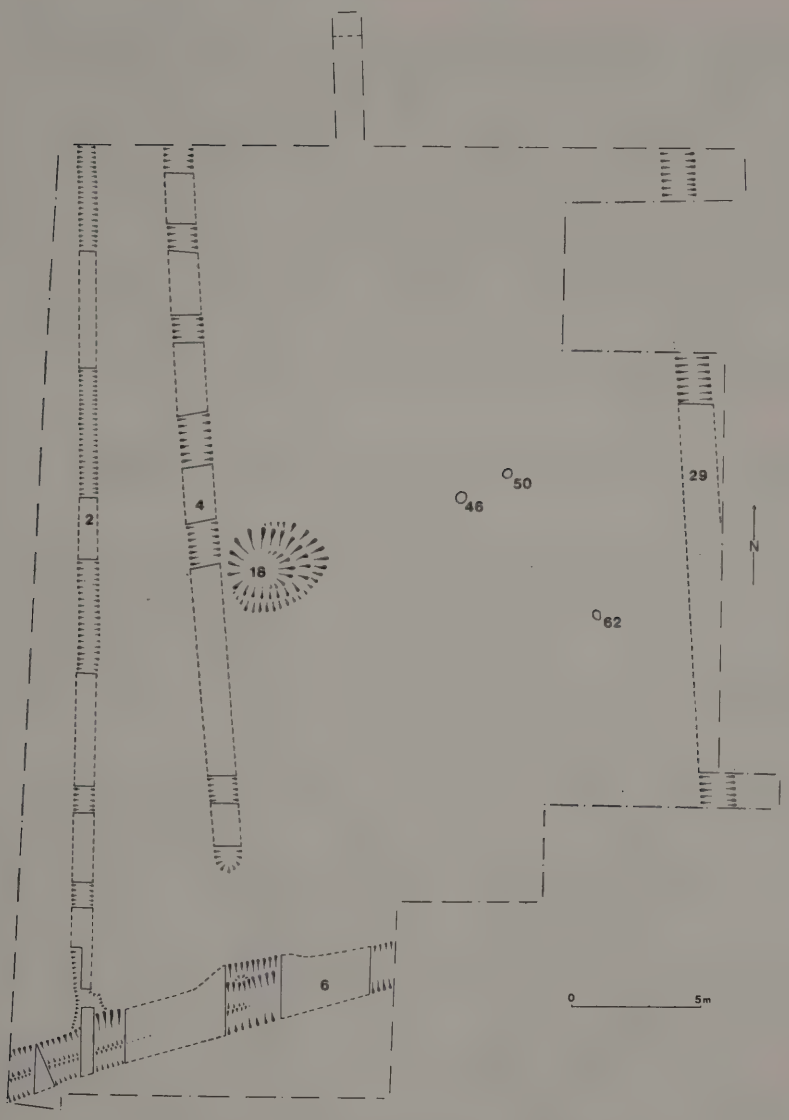

Fig. 13 Copse Farm, Oving. Trench E, plan.

Trench C, just to the north, excavated in 1980, also yielded plenty of Romano-British pottery. Machine clearance of the topsoil revealed a highly variable subsoil of calcareous alluvium. This was basically a white, compact, gritty chalk, but with many small lenses of softer grey material, which much resembled archaeological features. The excavated enclosure measured 18 m by 30 m, and it was thought that, since this was probably

rather small to be a field, it might be a settlement enclosure. In the event, the enclosure was almost empty, containing only three post-holes (none of which was definitely Roman), and one large pit, 2 m deep, with steeply sloping sides. The enclosure ditches were of variable profile; nos. 2 and 4 being shallow (up to 35 cm deep), whereas nos. 6 and 29 were rather deeper (up to 100 cm), the former having been re-cut once. Little Roman pottery was found, but there were large numbers of animal bones, particularly from the pit, and also from certain stretches of the enclosure ditches. The majority of these were of *Bos* (with some *Equus, Sus* and *Ovis*); most of the *Bos* bones were either skull fragments or from those parts of the leg with little meat value. It would appear, therefore, that one of the activities being carried out was the slaughtering of cattle, and disposal of unwanted pieces of the carcases. (Dressed carcases may well have been used to supply the inhabitants of nearby Roman Chichester.)

VIII. Excavations at Great Cansiron Farm, Hartfield, East Sussex

by D. R. RUDLING

During the winter of 1981/82, Giles Swift of the Wealden Iron Research Group discovered in a ploughed field on Great Cansiron Farm, Hartfield, an area of burnt clay and Roman tile, together with a few pieces of Roman pottery. The site, which lies close to a small stream (Fig. 14), is located between an extensive Roman iron-working site to the south-west (Tebbutt, 1972) and possibly large Roman iron ore quarries to the north-east (Swift, pers. comm.). In an attempt to interpret and more precisely date this site an excavation and survey were undertaken in the summer of 1982.

Trench 1 (Fig. 14) was located directly over the area of burnt clay and tile spotted by Giles Swift, and revealed a Roman tile kiln and a building which is interpreted as a drying shed. Unfortunately extremely inclement weather during the second half of the excavation meant that it was impossible in the time available to finish excavating either of these discoveries, and it is therefore planned to do so in 1983.

With regard to the kiln, which appears to be made entirely of 'brick' and tile, the firing chamber and stokehole were partially excavated, but the connecting fire-tunnel was left uninvestigated. The firing chamber (Plate IV), which still had a couple of flat tiles *in situ* as part of its floor, had a sub-floor structure of Grimes Type 3 (Grimes, 1930), with a series of closely spaced cross-walls (two remain intact) which were carried across the main central flue by arches. In between the cross-walls, at a higher level than the main flue, were cross-flues with sloping floors. Parts of the firing chamber have been analysed by Tony Clark of the Ancient Monuments Laboratory with the aim of obtaining an archaeo-magnetic date for the kiln.

The top of the stokehole was filled with large quantities of burnt clay (probably derived from the kiln super-structure) and small pieces of tile. Further down were discovered extremely large pieces of tile wasters, particularly from tegulae and box-flue tiles. Where the flue joined the stokehole its walls turned a right angle on each side

Fig. 14 Hartfield. (a) General map to show the locations of the excavations and the areas subjected to geophysical survey. (b) Plan of the main features in Trench 1.

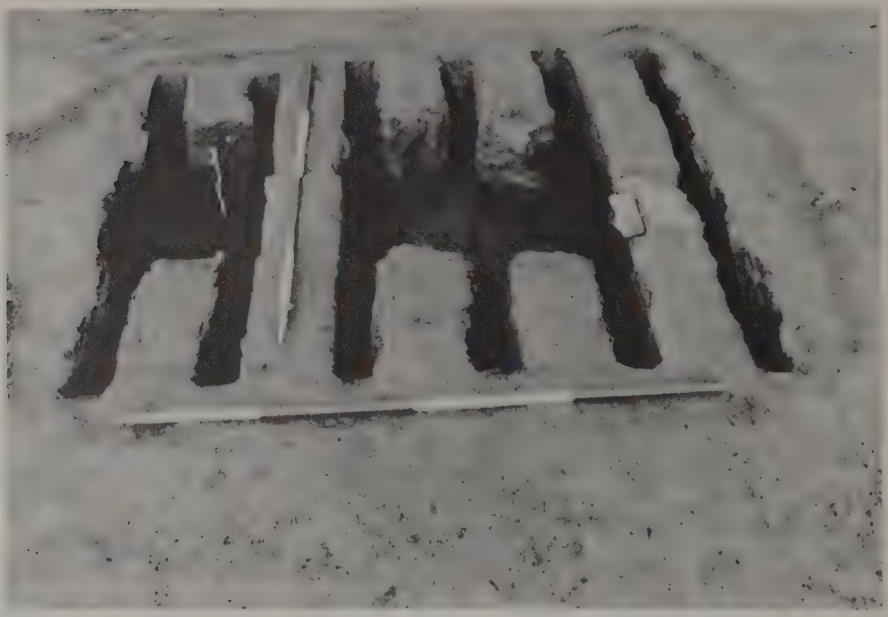

Plate IV Hartfield. Floor of the firing chamber of the Roman tile kiln. Scale 2 m.

forming a tile wall on the south side of the stokehole. Such an arrangement was also a feature of the kiln found at Wykehurst Farm, Cranleigh, Surrey (Goodchild, 1937), which is also similar in many other aspects to the Hartfield example. A small pit (19) containing charcoal was found next to the kiln. The 'drying shed' consists of two post-holes (32 and 34) at its northern corners and to the south of these a rectangular floor of broken tiles. A thin curved line of burnt clay (17) at the northern end of the structure in the area between the tile floor and the post-holes may indicate a fire. Possibly the floor continued further to the south, but this area was more severely disturbed by ploughing. Additional post-holes may still remain undiscovered at the southern end. It is likely that such a building would have been open-sided to aid the drying of the tiles prior to firing.

The tilery clearly produced a large range of tile types, including both varieties of roofing tiles, box-flue tiles (with combed decoration) and flat 'floor' tiles. None of the tiles so far discovered was stamped or decorated with roller-pattern designs.

Trench 1 also revealed several other features, such as a tile-lined post-hole (23) and another post-hole (28) with tile and slag packing. At the eastern side of the trench were several other possible post-holes and pits but lack of time prevented their investigation. A quick geophysical survey to the east of the trench located a possible pit.

Trench 2 was a trial trench designed to test a theory that a Roman road lay to the south of the kiln and drying shed. No such road or any other archaeological features were discovered however.

To the north of the kiln is a lynchet and to the west before one reaches the stream a flat, 'terraced' area. Both are located on the survey (Fig. 14) by David Tucker, as is a Roman/Medieval iron furnace discovered by the farmer, Mr Udell, during this year's ploughing. In the autumn a geophysical survey (supervised by David Haddon-Reece of the Ancient Monuments Laboratory) was done on the 'terraced' area. Anomalies likely to be of archaeological interest were discovered in both of the survey squares (Fig. 14a and b), particularly so in square B. The report on the survey is awaited with interest, especially since this area by the stream may have been the location of the workshops.

During 1983 it is planned to carry out aerial reconnaisance of the area and to return to the site and finish the excavations already begun. It is also hoped that there will be sufficient time available to undertake small excavations to date the nearby lynchet and iron furnace, and perhaps to start investigating the 'terraced' area next to the stream.

IX. Further fieldwork at Winchelsea, East Sussex

by D. R. RUDLING and P. LEACH

During 1982 further fieldwork (excavation and survey) was carried out in Edward I's planned town of New Winchelsea.

Excavations (directed by D. Rudling) were undertaken on the site of St Giles' churchyard, with particular emphasis being placed on its western boundary, which is the probable course of the second town wall planned in 1414 (Homan, 1949). The footings of a fairly narrow wall (Fig. 15) were discovered, but the only dating material consisted of several reused pieces of tooled/shaped medieval masonry. This wall is probably the churchyard wall, part of which may have been incorporated into the new system of town defences in the 15th century.

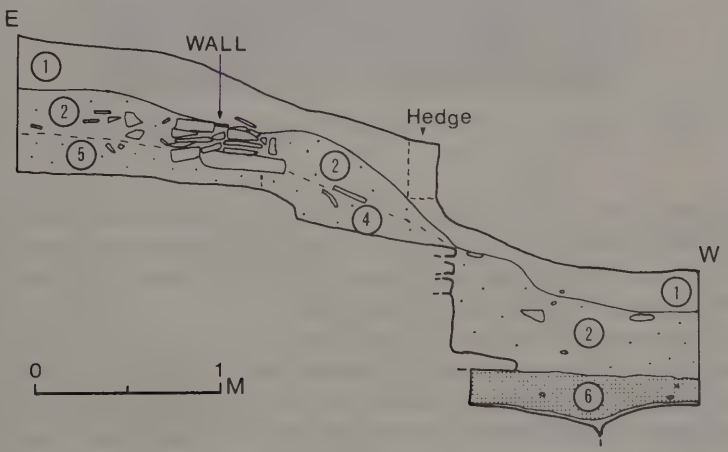

Fig. 15 St Giles' churchyard, Winchelsea. Section across the western boundary of the site.

Plate V St Giles' churchyard, Winchelsea. Medieval stone tomb. Scales in centimetres and decimetres.

Trial excavations to the east of the boundary wall revealed a high density of adult graves, the majority being buried in wooden coffins, but one having a stone tomb (Plate V). Since the church of St Giles was ruinous by the 16th century it is likely that most, perhaps even all, of the graves date to before 1500.

Other fieldwork at Winchelsea in 1982 consisted of survey work (directed by P. Leach) and involved the undertaking of detailed surveys of the three remaining town gates: the Pipewell Gate, the Strand Gate and the New Gate (Fig. 16), and the start of a programme of surveying the areas of the medieval town which now lie beneath grass fields. It is planned to continue the general survey work in 1983, and hopefully

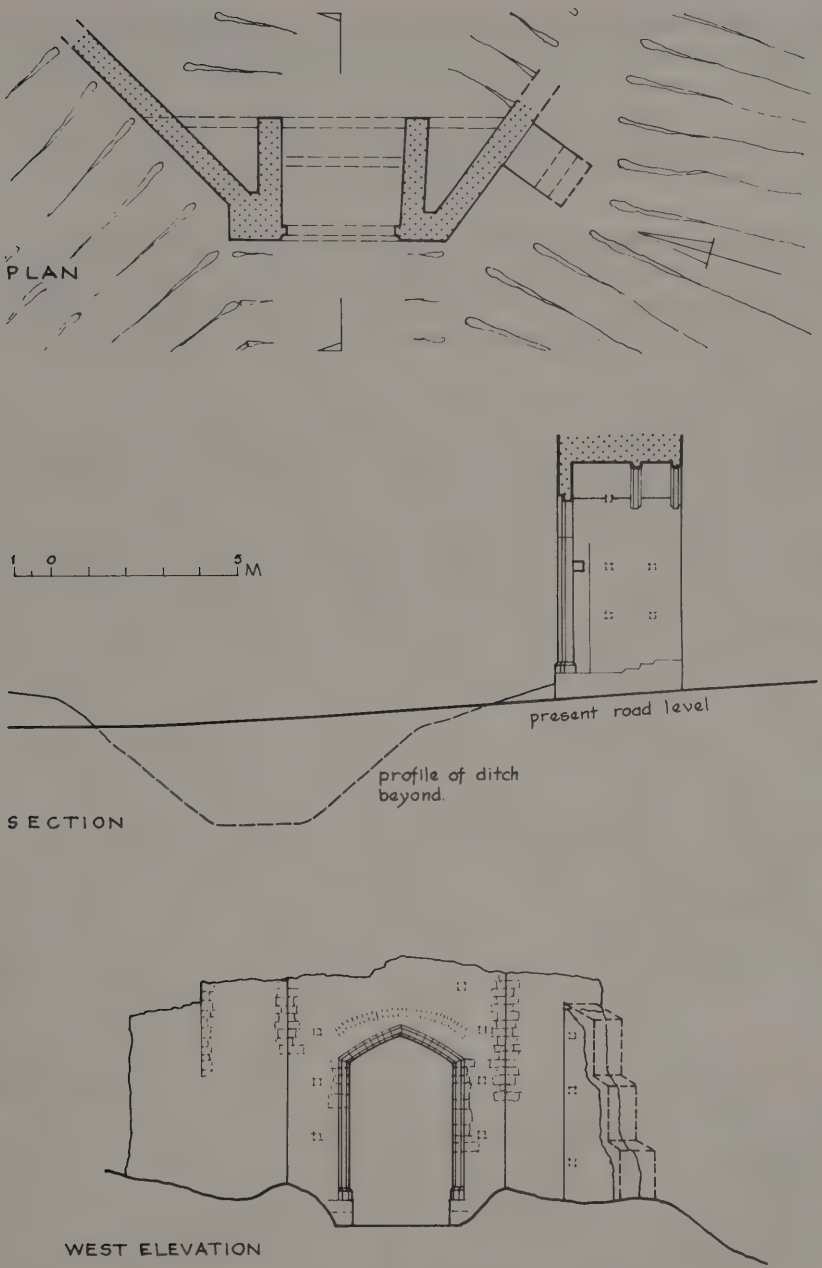

Fig. 16 New Gate, Winchelsea. Plan, section and elevation of the Gate.

also to survey the other as yet unrecorded medieval standing buildings, these being the remains of the Grey Friars and the Hospital of St John.

X. Further excavations at Selmeston, East Sussex

by D. R. RUDLING

As a follow-up to the excavations carried out in 1978 (Drewett, 1979) and 1981 (Rudling, 1982) further fieldwork was undertaken on an area of Lower Greensand on the eastern edge of the sand quarry (Fig. 17) which over the years has yielded considerable evidence for prehistoric settlement (Clark, 1934; Curwen and Curwen, 1938; Drewett, 1975b).

The excavations in 1978 and 1981 had been located immediately to the east of the quarry edge and this area was further investigated in 1982 by enlarging Trench 1 of 1978 and opening up two new trenches – 3 and 4. The enlarged Trench 1 revealed further evidence of the general spread of flint-making waste and the medieval field boundaries; and a couple of post-holes appear to be contemporary with those of mid-late Saxon date found by Peter Drewett in 1978. Unfortunately the Saxon occupation layer found by Drewett could not be traced to the east or south and may thus have extended to the west in the region now destroyed by the quarry. Other discoveries included a late Roman

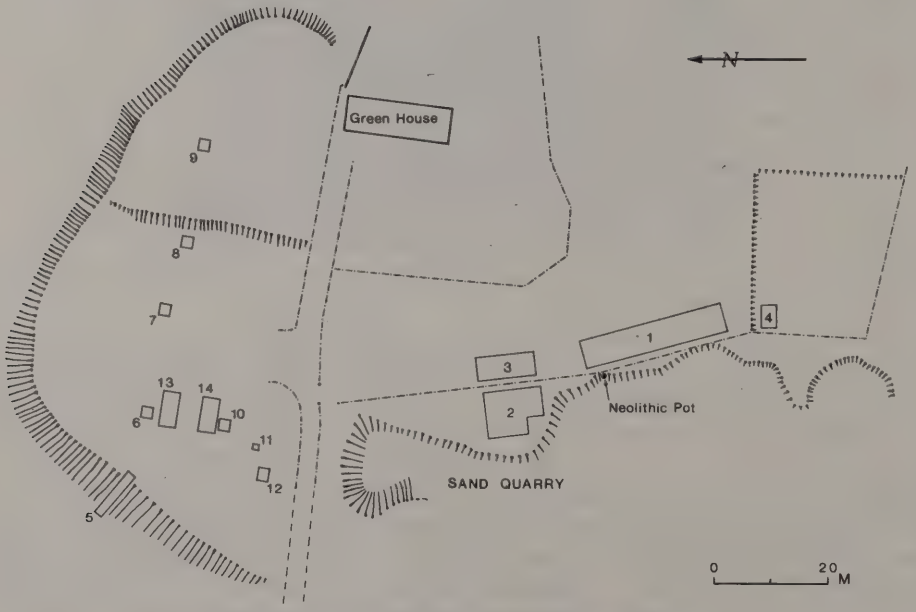

Fig. 17 Selmeston. General plan showing trenches.

bronze coin which may be connected with the nearby Roman road traced by Margary (1965), and a number of modern post-holes.

Further medieval field boundary ditches were found in Trench 3, and these link up those found in Trenches 1 and 2 (excavated in 1981). Trench 4 was located in an area which has already been stripped of topsoil ready for sand extraction (Fig. 17). Although the trench uncovered no archaeological features it did produce some flintwork.

In addition to the excavations described above, an area to the north was also sample excavated in 1982. This area, which lies immediately to the north of the track which connects the Green House (a medieval building) to the parish church, is delimited by a fairly prominent bank, and is subdivided by a much lesser bank (Fig. 17). A trench (5) was cut across the main enclosing bank in the hope of dating it. Little archaeological material was discovered in the bank, which could not therefore be satisfactorily dated. The lower end of the trench however revealed cart ruts, thus showing that a road/track once went around the outside of the bank, and this is supported by documentary evidence (maps) which show that such a track existed by at least 1811 (these early 19th century maps do not show the current track, thus showing it to be relatively recent in date). Eileen Howard and Monica Maloney of the Lewes Archaeological Group carried out a hedge species count/dating investigation in the area of the 1982 excavations, and by applying Hooper's hyopthesis (Pollard *et al.*, 1974) concluded that the hedge bordering the 'field' west of the Green House, north of the present lane, 'could be around 600 or more years old, and so possibly of medieval origin' (Howard and Maloney, pers. comm.).

Sample excavations (trenches 6–14) within the area enclosed by the bank described above were designed to both discover possible areas of concentrated prehistoric flintwork (similar to those found in the past in the quarry to the south-west) and any traces of Saxon and/or medieval occupation, thus perhaps explaining why the ?medieval track made such a detour around the banked area. The trenches revealed general scatters of flintwork (but no large concentrations) and medieval pottery. Although two large post-holes (in trenches 6 and 13) appear to be medieval, no other features were discovered. The area was a field in 1811 and it is therefore possible that other traces of medieval occupation may have been destroyed by latter agricultural activities.

Acknowledgements

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Mr F. G. Aldsworth; Dr A. G. Woodcock; Dr J. Thomas, Principal of the Worthing College of Technology; Mr and Mrs A. Mackenzie Smith; the National Trust; Mr and Mrs C. Croggon; Mr and Mrs J. Coleman; Mr and Mrs O. Sels; Mr E. Udell; Mr and Mrs P. Latham; Mr S. Hornby; Ms W. Horton; Ms B. Holgate; Mr T. Cawood; Ms A. Ellerby; Mr K. Whittaker; Mr G. Swift; Mr and Mrs C. F. Tebbutt; Mr and Mrs D. Coombes; Mr D. Tucker, Mr M. Roberts; Mr J. Hadfield; Ms R. Wears.

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The Use of Student's *t*-test for Matching Tree-ring Patterns

by C. R. ORTON

Student's *t*-test has been widely used in the UK as an aid to the visual matching of tree-ring pattern since its introduction in the CROS program (Baillie and Pilcher, 1973). It has been used relatively little in the USA, partly because its use is invalidated by missing or double rings, which are far more common in the soft-wood chronologies of the USA than in the predominantly oak chronologies of north-west Europe (Fritts, 1976: 32). The test is still in use in its original form (Baillie, 1982: 32–5), which is set out by Baillie and Pilcher (1973) and can be summarised as:

> transform the ring widths by converting each to a percentage of the five-point moving average of which it is the middle point (to remove trend) and taking logarithms to remove skewness and achieve approximate Normality. Calculate the correlation coefficient r for all possible overlaps of the two patterns, except for those of less than 15 years. Test the significance of each r, using a one-sided t-test. Values of t rather higher than the customary value of 2 have been found empirically to indicate significance: 3.5 is often used (Baillie, 1982; Hillam, 1980).

The t-test is appropriate for making one such comparison of two sets of tree-ring widths, but if simultaneous comparisons are made (CROS may perform hundreds in one run), adjustments must be made in the calculation of significance levels. We need, not the significance of achieving a certain value of t in one comparison, but that of obtaining one such value in several comparisons. Performing many comparisons, finding the highest value of t and testing it as if it were the only value, overstates the significance of that value.

Suppose that two patterns with n_1 and n_2 rings are compared. The number of comparisons is $m = n_1 + n_2 - 30$, since overlaps of less than 15 years are excluded. Suppose that at a certain overlap a value of $t = t_\alpha$ is obtained, whose significance level is α, i.e. $\mathrm{pr}(t \geqslant t_\alpha) = \alpha$. Then the true significance level of the test is p, the probability that one or more t's in m comparisons are greater than t_α, which is given by $p = 1 - (1 - \alpha)^m$.

As an example, the values of α given in Table 1 by Baillie and Pilcher (1973) are re-calculated in Table 1 here. The (unpublished) values of m must exceed the published 'years of overlap' (which is the number of comparisons made before the quoted

Table 1 Comparison of published and recalculated significance levels of values of t derived from matching selected tree-ring patterns (after Baillie and Pilcher)

Laboratory number for				'Limits'	
Tree A	Tree B	Years of overlap	Student's t	Published	Recalculated * (%)
537	538	160	3.87	10^{-4}	1.5
536	542	156	5.46	5×10^{-8}	0.0008
536	538	106	5.29	10^{-7}	0.001
547	535	116	5.19	5×10^{-7}	0.006
536	537	114	3.59	5×10^{-4}	5.6
542	537	157	3.09	3×10^{-3}	37.5
553	542	119	3.89	10^{-4}	1.1
536	544	122	3.39	10^{-3}	11.4

* Minimum values, since the number of comparisons is at least as great as 'year of overlap'.

value of t is reached, and *not* the number of years by which the patterns overlap at that value). In each case, the 'limit' is increased by a factor of about m, which is to be expected since $1-(1-\alpha)^m \doteq m\alpha$ if $m\alpha$ is small. Bearing in mind that the recalculated 'limits' are under-estimates, Table 1 shows that for these data, values of t between 3 and 4 are not nearly as significant as they appear, and only those greater than 5 give unequivocal grounds for a 'match'.

No single critical value of t will suffice for all situations, since it depends both on m, the number of comparisons, and on the length of the overlap. The values of t needed to give a true value of α of 5% are shown in Fig. 1, for a range of values of m and for the least, greatest and 'typical' overlaps. In 'typical' situations (e.g. those in Table 1), values of t between 3.6 and 4.0 (close to the empirical value of 3.5) are significant at the 5% level: shorter overlaps increase these values to between 4 and 5, while longer overlaps make relatively little difference.

The use of the t-test depends on the assumption that the patterns are random samples from a bivariate Normal distribution. Work in the USA (Fritts, 1976: 258) suggests that in general ring-width patterns are not random, as they exhibit strong but varying degrees of autocorrelation. The use of moving averages should remove autocorrelation due to the growth trend, but creates new autocorrelations in the residuals (Kendall, 1973: 44). Both inherent and induced autocorrelations reduce the effective size of the samples, and thus the effective value of t. These effects have been recognised (Baillie, 1982) but the scale of these effects on oak chronologies is yet to be generally established.

A completely different approach has been put forward and appears to work well (Laxton and Litton, 1982, 1983). However, since the t-test is well established and seems

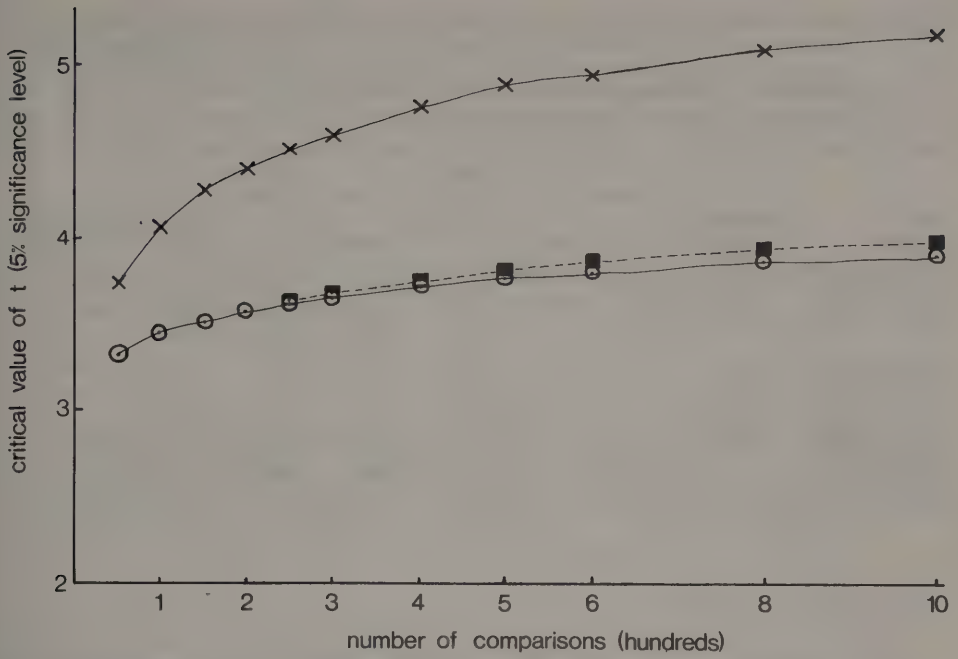

Fig. 1 Critical value of t at significance level of 5% for values of m from 50 to 1,000. Key: × = least possible overlap (15 years); ⊙ = greatest possible overlap ($\frac{1}{2}m + 15$ years); ■ = 'typical' overlap (120 years).

likely to continue in use, an alternative approach via extreme-value theory is suggested. Since there can be at most one significant value of t from m comparisons, the 'first difference' (Gumbell, 1958: 55) (i.e. the difference between the highest and second highest value of t) provides a test of significance of the highest value. Using the Normal distribution as an approximation (Pearson, 1931: 160), critical values of the first difference (5% level) are found to range from about 0.8 (m = 1,000) to 1.1 (m = 50), and to be about 0.9 for the 'typical' values of m in Table 1.

Outcomes of the adjusted t-test and the first difference test are shown in Table 2. The first comparison shows one value (t = 7.31) which is clearly significant, but two other values (t = 4.10 and 4.03) which would conventionally be thought significant if the first value did not exist, and which exceed their recalculated critical values. However, the diference between the second and third is so small as to discount their significance in the absence of the first. The second comparison (see also Fig. 2) shows a clearly significant highest value, with a second value which, although high, fails to exceed its recalculated critical value. In the third comparison, the Calverts curve has been extended with a mis-matched segment, reducing the first value but not the second. Adjustment

Table 2 Three examples of comparisons of tree-ring patterns, showing calculated values of t and its first difference, with recalculated significance levels of t. The sites referred to are Calvert's Buildings, Southwark (by permission of I. Tyers, Southwark and Lambeth Archaeological Excavation Committee), and Peninsular House and New Fresh Wharf, Cityof London (by permission of J. Hillam, University of Sheffield)

Tree numbers	Numbers of rings	Number of comparisons	Highest values of Student's t	'Years of overlap'	Actual years of overlap	5% level of t	First difference
PH MASTER	322	574	7.31	461	143	3.9	3.21
NFW MASTER	282		4.10	348	256	3.8	(0.07)
			4.03	352	252	3.8	
PH/NFW MEAN	461	573	5.17	295	295	3.8	1.34
CALVERTS 2	142		3.83	556	47	> 4.0	
PH/NFW MEAN	461	620	4.30	342	308	3.8	0.48
CALVERTS 1	189		3.82	603	47	> 4.0	(0.42)
			3.40	204	204	3.9	

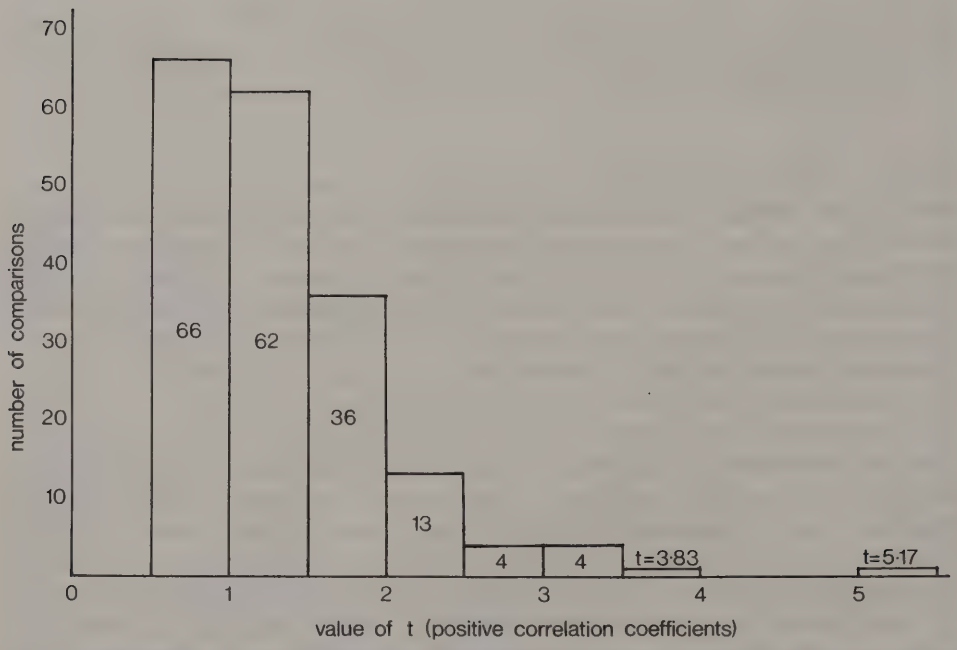

Fig. 2 Histogram of values of t from 573 comparisons between patterns PH/NFW MEAN and CALVERTS 2. The single significant value stands out clearly.

of the first difference to allow for the different lengths of overlap is desirable but has not been attempted here.

If the *t*-test is to be used effectively, significance levels should be recalculated for each test, and other methods (e.g. first-difference test or plotting of frequencies, as in Fig. 2) should be used as a further check.

Acknowledgements

Thanks are due to the Department of the Environment and D. Haddon-Reece of the Ancient Monuments Laboratory for computing facilities and software.

Abstract

Disquiet has been expressed over the statistical methods used in tree-ring dating, and in particular about the use of Student's *t*-test for matching one tree-ring pattern to another. Examination of methods commonly in use has revealed some deficiencies and suggested some improvements.

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INSTITUTE OF ARCHAEOLOGY

Celtic Coins Found in Britain, 1977–82

by COLIN HASELGROVE

In 1978, on the occasion of the reprinting of *Problems of the Iron Age in Southern Britain* (ed. S. S. Frere) containing the late Derek Allen's massive gazetteer of find-spots of Celtic coins in Britain, the Institute of Archaeology also published my addendum of coins found between 1960 and 1977 as a supplement to the original volume. Since that date, material has continued to accumulate at an ever-increasing rate and, as a result, it was decided that an attempt should be made to update the previous lists. The substance of this article, then, is a gazetteer of coin finds noted by the author over the five years which have elapsed. Following the earlier publications, this list records in abbreviated form the basic information relating to each discovery. (To maintain consistency with the 1960 and 1977 lists, the county boundaries given here are those that existed in England and Wales prior to the 1974 local government reorganisation.) For reasons of space, previously unrecorded coin types are not described in detail; photographs of the majority of these coins are kept in the Index of Celtic Coins maintained at the Institute of Archaeology, Oxford, and may be inspected by prior arrangement.[1] Similarly, bibliographic details are normally restricted to a single source.

Although in general perhaps a period of consolidation in Celtic coin studies, the last five years has seen a number of major advances in our knowledge. Undoubtedly, the most significant landmark has been the publication of Simone Scheers' major re-evaluation of the pre-Roman coinages of Belgic Gaul (Scheers, 1977), including several which occur in quantity in south-eastern Britain. Her corpus for the first time allows the material found in Britain to be fully related to its Continental counterparts, and will form the principal framework for the study of the introduction of coinage to Britain for many years to come. Also for the first time, a site excavated by modern techniques and yielding a reasonably long Iron Age coin list recorded from stratified contexts, the important late pre-Roman Iron Age nucleated settlement at Skeleton Green, Braughing, has been published (Partridge, 1981). Comparisons of the dating indicated by the coin lists and that derived from sizeable assemblages of well-dated imported Roman ceramics on this and other sites should prove particularly instructive. Publication of the temple complex at

[1] As well as information pertaining to the find-spot and a photograph, usually at 2:1, the card for each coin records details of weight, specific gravity, present location and bibliographical information, where these are known. Enquiries should be made to the Secretary, Institute of Archaeology, 36 Beaumont Street, Oxford. Professor Frere will also be most grateful to receive details of fresh discoveries.

Harlow is also well in hand. More recently excavated sites include the temple on Hayling Island, Hampshire (Downey *et al.*, 1980), and various of the Canterbury sites excavated by the Canterbury Archaeological Trust. The most prolific site of all at Hengistbury Head, Dorset, has been the subject of renewed investigation which should clarify our understanding of the context of the earlier finds. With an increasing emphasis on fieldwork, several as yet unexcavated sites have also yielded a quantity of pre-Roman coins, chief among them the site at Woodcock Hall, near Saham Toney in Norfolk. Important new hoards which have come to light include one reputedly found at the Roman temple site on Weycock Hill, Waltham St Lawrence, Berkshire, and others from Cheriton and Ellingham, Hampshire, Henley in Oxfordshire and Farnham in Surrey.

The coinages of the west of Britain, conventionally ascribed to the Dobunni and the Durotriges, have been the subject of research by Lyn Sellwood and Melinda Mays respectively, the publication of which will present a signal advance in our knowledge of the pre-Roman coinage of that area, a subject which had received little attention since Allen's work in the 1950s. Also of fundamental importance will be the results of the programme of metallurgical analysis being undertaken by the British Museum Research Laboratory under the guidance of Dr J. P. C. Kent and following on the publication of his stimulating reappraisal of the origins and development of gold coinage in Britain (Kent, 1978). Elsewhere, research has been uneven, with the coinage of the south of Britain receiving most attention (Allen and Haselgrove, 1979; Nash, forthcoming; Robinson, 1978); mention should also be made of the publication of a new series of distribution maps for the principal coinage types in a volume which also contains important articles on the nature and functions of coinage in Celtic society and on the problems of interpreting coin finds relating to the pre-Roman period (Cunliffe, ed., 1981). A selection of the major publications with a bearing on the origins and purpose of pre-Roman coinage in Britain are included in the bibliography at the end of this article.[2]

It is unfortunately necessary to reiterate the principal cautions expressed in the 1978 supplement to the *Gazetteer*. For many of the finds the grid references given are either in some doubt, or only approximate, at an accuracy intended for the preparation of small-scale distribution maps, and for the majority of chance finds, the standard of the recording still leaves much to be desired. Similarly, for reasons that need not be repeated here, the list of find-spots included in this article must be regarded as recording no more than a proportion of the finds which have actually been made in the period 1977–82; in all probability a minority of the single or casual finds, those which have been brought to the attention of local museums and other archaeological bodies. It is to be hoped that the establishment of a permanent Celtic Coin Committee by the British Academy will go much of the way towards remedying this situation; the Committee is currently exploring means of improving the recording of new discoveries and also of

[2] Also included in the bibliography is Allen's comprehensive survey of Celtic coinage in Europe (Allen and Nash, 1980), an article on the evidence for coin production at Aulnat and Levroux in France, which includes a gazetteer of sites where so-called coin moulds have been found in western and central Europe (Tournaire *et al.*, 1982), and Sellwood's re-evaluation of the role of this enigmatic material in metalworking (Sellwood, 1980).

facilitating the dissemination of information, including possibly, at some date in the future, the computerisation of some of the information at present stored on the cards in the Celtic Coin Index at Oxford.

In conclusion, I should like once again to thank Professor S. S. Frere for permission to make use of his index of Celtic coins, and all those who have assisted in the compilation of this gazetteer. In particular, I am indebted to Lyn Sellwood and Tony Gregory, who have collaborated in the preparation of the sections dealing with the Dobunni and the Iceni respectively and also to Robin Brown. The Index has been maintained successively by Roger Goodburn, Francis Grew and Lynn Pitts, whose assistance is gratefully acknowledged. Vera Sudworth and Pamela Lowther undertook the arduous task of typing the bulk of this manuscript. Finally, warmest thanks are due to Dr John Kent of the British Museum, and Dr Daphne Nash of the Ashmolean Museum for allowing me to make use of unpublished information, and for all their advice and encouragement.

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Available from the Institute of Archaeology, University of London, 31–34 Gordon Square, London WC1H 0PY (plus postage and packing; all orders will be invoiced).

Gazetteer

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
		GALLO-BELGIC A			
	Essex				
TL 99.25	Colchester, before 1976	1 Æ	Series II	Index of Celtic Coins, Institute of Archaeology, Oxford (hereafter Index)	Rodwell (1976: 186) treats this as distinct from the Layer de la Haye find. I suspect they may be one and the same
TL 85.06	Maldon, 1967 or before	1 Æ	Series II	Index	–
	Hertfordshire				
TL 350125	Hertford, 1976 or before, Rush Green	1 Æ	Series I	Haselgrove, 1978: 9 as Gallo-Belgic C	Later type; same series as B.M. 1767
	Kent				
TR 30.45	Near Dover, 1976 or before, Whitfield	1 Æ	Series I	Index	Late type
TQ 73.76	Sheppey, 1977 or before, Warden Bay, Cliffe	1 Æ ¼	Series II	Index	Shown B.M.
TQ 86.65	Sittingbourne, 1982 or before, Newington	1 Æ ¼	Series II	Index	Shown B.M.
	Middlesex				
TQ 17.78	Brentford, near, 1982	1 Æ ¼	Series II	Index	Shown, Museum of London
	Oxfordshire				
SU 76.82	Henley, near, 1982 or before, Harpsden Wood	1 Æ, in hoard	Series II	Seen B.M.	See *Gallo-Belgic E*
	France				
Continental	Sorel-Moussel, Eure et Loire	1 Æ ¼	Series I or II	Scheers, 1977: 260	Indentified as DLT 7894, but possibly this
	Beauvais, Oise	1 Æ ¼	Series II	Scheers, 1977: 260	
	Vendeuil – Capley, Oise	1 Æ/ Æ ¼	Series II	Scheers, 1977: 260	
	Belleville-sure-Mer, Seine-Mme	1 Æ ¼	Series I	Scheers, 1977: 261	
	Lillebonne, Seine-Mme, 1907	1 Æ ¼	Series I	Scheers, 1977: 261	
	Lintot Les-Bois, Seine-Mme	1 Æ ¼	Series II	Scheers, 1977: 261	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Martin-Église, Seine-Mme	1 *N*	Series I	Scheers, 1977: 261	
	Oissel, Seine-Mme	1 *N*	Series I	Scheers, 1977: 261	
	Vatierville, Seine-Mme	1 *N* ¼	Series I	Scheers, 1977: 261	
	Abbeville, Somme	1 *N* ?	Series I or II	Scheers, 1977: 261	
	Amiens and neighbourhood, Somme	3 *N* ¼	Series II	Scheers, 1977: 262	
	Oisement, Somme	1 *N*	Series I or II	Scheers, 1977: 262	
			GALLO-BELGIC B		
Continental					
	France				
	Bavay, Nord	1 *N* ¼	BB2	Scheers, 1977: 288	
	Dunkerque, Nord	1 *N* ¼	BB2	Scheers, 1977: 288	
	Chelles, Oise	1 *N* ¼	BB2	Scheers, 1977: 288	
	Frévent, Pas-de-Calais	1 *N*	BA1?	Scheers, 1977: 288	7.79 g
	Corbie, Somme	1 *N* ¼	BB2	Scheers, 1977: 289	
	Near Neufchateau, Vosges	1 *N* ¼	BB2	Scheers, 1977: 289	Or at Château-Salins, Moselle
	Belgium				
	Roulers, Flandre, Occidentale, 1806	1 *N* ¼	BB2	Scheers, 1977: 290	
			GALLO-BELGIC C		
	Essex				
TL 72.79	Shalford	1 *N*	C	Allen, 1960:148, as *Gallo-Belgic A*	Scheers, 1977, Class 2.
	Kent				
TQ 652594	Addington, 1980, Sandpits	1 *N*	C	Index	Found during clearing of dryer
TQ 88.33	Tenterden, 1980	1 *N*	C	Index	
Continental					
	France				
	Bouvines, Nord, 1876 or before	2 *N*	C	Scheers, 1977: 275	
	Hénu, Pas-de-Calais 1860	1 *N*	C	Scheers, 1977: 277	
	Near Amiens, Somme	1 *N*	C	Scheers, 1977: 277	

	Chilly, Somme, 1980	1 *N*, in hoard?	C	*Revue Archéologique de Picardie*, **4**: 92–118,	See also Potin
Corrections					
Delete:	Soissons, Aisne	1 *N*	C	(Allen, 1960: 157)	Another type (Scheers, 1977: 274, note 515)
Delete:	Roye, Somme	1 *N*	C	(Allen, 1960: 158)	Another type (Scheers, 1977: 274 note 515)
		GALLO-BELGIC D			
	Bedfordshire				
SP 956568	Odell	1 Æ / *N* ¼	D_A	Index	B. Dix excavations
	Hampshire				
SU 20.09	Ellingham, 1980, Castle Piece, Roe Wood	1 *N* ¼	New variety	Seen B.M.	See also *British A* and *Armorican Gold*
SZ 170908	Hengistbury Head, 1952	1 *N* ¼	D_C	Glendining, 7/1976, lot 4	
	Lincolnshire				
SK 842776	Fenton, 1982	1 *N* ¼	D	Index	Class 4
	Norfolk				
TG 241040	Caistor-by-Norwich	1 *N* ¼	D_C	A. Gregory (pers. comm.)	
	Sussex				
SZ 91.98	Bognor Regis, Aldwick	1 *N* ¼	D_C	Index	Possibly the coin listed as Chichester, 1970 (Haselgrove, 1978: 14)
Continental					
	France				
	Near Bavay, Nord	2 *N* ¼	Class 3	Scheers, 1977: 301	
	Esquerchin, Nord	1 *N* ¼	Class 5	Scheers, 1977: 302	
	Beaulencourt, Pas-de-Calais	1 *N* ¼	Class 3	Scheers, 1977: 303	
	Sangatte, Pas-de-Calais, 1866 or before	Sev. *N* ¼	Class 3?	Scheers, 1977: 303	Found on the beach. Scattered hoard?
		GALLO-BELGIC XC2			
	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Weycock Hill Temple	1 *N* ¼ in hoard	XC2	J. P. C. Kent (pers. comm.)	Hoard 81
	Sussex				
SZ 838934	Selsey, 1873 or after	13 *N* ¼, in hoard	XC2	Willett, 1879. 86	Hoard 18

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
		GALLO-BELGIC E			
	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Weycock Hill Temple	1 *N*, in hoard	E	J. P. C. Kent (pers. comm.)	Hoard 81
	Hampshire				
SU 724029	Hayling Island, 1977–9, Temple	2 Æ/*N*	E	D. Nash (pers. comm.)	
	Kent				
TR 15.58	Canterbury, 1967, College Road	1 *N*	E	Noted by author	Canterbury Museum
	Lincolnshire				
TA 112148	Ulceby, Alford, 1981 or before	1 *N*	E	Index	
	Norfolk				
TG 52.03	Gorleston, 1960	1 *N*	E	A. Gregory (pers. comm.)	
	Oxfordshire				
SU 76.82	Henley, near, 1982 or before, Harpsden Wood	16 *N*, in hoard	E	Seen B.M.	Classes 2–3. See also *Gallo-Belgic A*
	Surrey				
SU 84.46	Farnham, 1980, Farnham Park	5 *N*, in hoard	E	Seen B.M.; M. Millett (pers. comm.)	Classes 2 (2) and 4 (3). See also *British Q*
	Wiltshire				
ST 87.87	Easton Grey, before 1981	1 Æ/*N*	E	*Wiltshire Arch Mag*, 1981: 83 f.	
Continental					
	France				
	Bavay, Nord	6 *N*	E	Scheers, 1977: 347	Scattered hoard?
	Berlaimont, Nord	1 *N*	E	Scheers, 1977: 347	
	Flaumont-Waudrechies, Nord, 1905	3 *N*	E	Scheers, 1977: 347	Scattered hoard?
	Haut-Lieu, Nord	1 *N*	E	Scheers, 1977: 347	
	Soire-Le-Chateau, Nord, 1852	1 *N*	E	Scheers, 1977: 348	Scheers, Hoard 81 bis
	Lépine, Pas-de Calais, 1974	1 Æ/*N*	E	Scheers, 1977: 348	Found in excavations
	Combles, Somme	1 *N*	E	Scheers, 1977: 350	
	Marcheville, Somme	1 *N*	E	Scheers, 1977: 350	

	Netherlands				
	Bladel, Brabant Sept	1 Æ	E	Scheers, 1977: 352	
	Kessel, Limbourg	1 Æ	E	Scheers, 1977: 352	
Correction					
	Belgium				
Delete:	Bikschote, Flandre Occidentale	1 Æ	E	(Allen, 1960: 166).	Another type (Scheers, 1977: 350, note 540)
			BRITISH A		
	Hampshire				
SU 20.09	Ellingham, 1980, Castle Piece, Roe Wood	1 Æ in hoard	A1	Seen B.M.	See *Gallo-Belgic D* and *Armorican Gold*
SU 724029	Hayling Island, 1978	1 Æ/Æ	A	D. Nash (pers. comm.)	
	Surrey				
SU 84.47	Farnham, before, 1864, Castle	1 Æ	A?	R. Whitbourne, letter 1864	Described as uniface. Possibly the coin found near Guildford in 1864 (Evans, 1864: 434)
			BRITISH B		
	Hampshire				
SU 565085	Fareham, 1981 or before, near Dean Farm	1 Æ	B	Index	
SU 724029	Hayling Island, 1980	1 Æ	B	D. Nash (pers. comm.)	Only a quarter survives
SU 71.14	Old Blandworth, 1978	1 Æ	B	D. Nash (pers. comm.)	Other provenances have been claimed for this coin
	Wiltshire				
SU 25.60	Grafton, before 1903, Wolfhall	1 Æ	B	Sotheby sale, 1903, lot 333	
			BRITISH D		
	Hampshire				
SU 58.28	Cheriton, 1983	18 Æ in hoard	cf D	Seen B.M.; J. P. C. Kent (pers. comm.)	These coins represent several varieties of a type which itself might be described as a prototype for British D. See also *British O.*
SU 70.13	Horndean, 1977 in a garden	1 Æ	D	*The News* (Portsmouth), Feb. 1978	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
			BRITISH H		
	Lincolnshire				
SK 98.72	Lincoln, 1966–7	1 Æ	H_A	Index	
			BRITISH I		
	Lincolnshire				
SK 905138	Dragonby, 1975	1 Æ	I_D	Index	
TA 093112	Kirmington, 1973	1 Æ	I_C	Index	
SK 828757	Kettlethorpe, 1982 or before	1 Æ	I_C	Index	
TF 206896	Ludford Magna, 1982 or before	1 Æ	I_D	Index	
TF 212897	Ludford Magna, 1980	1 Æ	I_D	Index	
SK 98.56	Navenby, 1982, 1½ miles to the south along Ermine Street?	1 Æ	I_C	Index	
	Northamptonshire				
SP 874803	Kettering, 1971, Kipling Road	1 Æ/Æ	I_D	Index	
	Rutland				
SK 910171	Thistleton, 1974	1 Æ/Æ	I_D	Index	
	Yorkshire				
TA 072218	Barrow-on-Humber, 1980, garden in Cherry Lane	1 Æ	I_D	Index	
			BRITISH J		
	Norfolk				
TL 938840	Brettenham, 1979	1 Æ	J	A. Gregory (pers. comm.)	
TF 79.04	Cockley Cley, before 1982	1 Æ	J	A. Gregory (pers. comm.)	Known site
TF 68.32	Ingoldisthorpe, 1982	1 Æ	J_A	A. Gregory (pers. comm.)	
TL 793943	Mundford, 1981 or before	1 Æ	J	A. Gregory (pers. comm.)	
TF 887003	Saham Toney, 1977, Woodcock Hall	1 Æ	J_B	R. A. Brown (pers. comm.)	
			BRITISH K		
	Hampshire				
SU 724029	Hayling Island, 1977, Temple	1 Æ/Æ	O	D. Nash (pers. comm.)	

	Leicestershire				
SK 60.13	Cossington, 1969	1 Æ	K_A type uncertain	Noted by D. F. Allen	
	Lincolnshire				
SE 905138	Dragonby, 1967	1 Æ/Æ	P	Index	
	Dragonby, 1974	1 Æ/Æ	O	Index	
	Dragonby, 1979	2 Æ/Æ	M,N	J. May (pers. comm.)	Surface finds
TF 26.69	Horncastle, 1966	1 Æ/Æ	O	Index	
TA 093112	Kirmington, 1950	1 Æ/Æ	O	Index	
	Kirmington, 1972	1 Æ/Æ	P	Index	
TF 20.89	Ludford Magna, 1972	1 ÆR	P	Index	
SK 98.87	Owmby, 1972	1 Æ	L	Index	
TF 08.25	Stainfield	1 Æ/Æ	O	Index	
	Rutland				
SK 928075	Whitwell, 1976	1 Æ	P	Index	
	Yorkshire				
SE 58.03	Doncaster, near, 1982 or before	1 Æ/Æ	cf. 449b	Index	
SE 426133	Hemsworth, 1976	1 Æ	O	Index	
TA 24.42	Hornsea 1965, south of Cowden Beach	1 Æ	N	Index	
SE 80.84	Pickering	1 Æ	O	Index	
			BRITISH L		
	Essex				
TL 58.42	Ashdon, 1982	1 Æ	L_B	Index	Owner lives there
TM 25.21	Walton-on-the-Naze, 1977	1 Æ	L_B	Index	New variety. Broken
	Glamorgan				
ST 15.97	Pengam, 1981, Lewis's School	1 Æ	L_B	Index	
	Hampshire				
SU 724029	Hayling Island, 1980, Temple	1 Æ /Æ	L_B	D. Nash (pers. comm.)	
	Hertfordshire				
TL 39.24	Braughing district	1 Æ ¼	New type	Index	To be published
	Norfolk				
TF 81.09	Swaffham, before 1958	1 Æ	L_A	A. Gregory (pers. comm.)	Or L_C?
	Suffolk				
TM 30.56	Wickham Market, 1981	1 Æ	L_B	Index	On route of A12 bypass

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
		BRITISH L_X – GOLD			
	Essex				
TL 637149	Pleshey, near, 1978	1 A ¼	Lx2	*Essex Arch News*, Spring, 1978: 14	
TM 25.21	Walton-on-the-Naze, 1977	1 A ¼	Lx2	Index	
	Norfolk				
TF 807003	Saham Toney, 1977, Woodcock Hall	1 A ¼	New type	R. A. Brown (pers. comm.)	
	Suffolk				
TM 14.51	Barham, 1978, behind the church	1 A ¼	Lx2	Index	
TM 30.59	Hacheston, 1981	1 A ¼	Lx2	Index	
TL 86.46	Long Melford, 1982	1 A ¼	Lx2	Index	
		BRITISH L_X – SILVER			
	Bedfordshire				
TL 16.49	Sandy, 1981 or before	1 R	Lx14	Index	
	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Waycock Hill, Temple	1 R in hoard	New type	J. P. C. Kent (pers. comm.)	Hoard 81
	Cambridgeshire				
TL 443594	Cambridge, 1974–7, Castle Hill	1 R	New type	Noted by author	Fitzwilliam M.
		1 R	Lx14		
	Essex				
TL 48.21	Bishop's Stortford, near	1 R	New type	Index	Obv. has affinities with Lx10
TL 470127	Harlow, 1970, Holbrooks	1 R	Lx14	Harlow M.	Identified by author
	Hampshire				
SU 724029	Hayling Island, 1978, Temple	1 R	Lx15 var.	D. Nash (pers. comm.)	Obv. beast left. Excavations
		1 R	Lx10 var.		
SU 74.23	Petersfield, near	1 R	New type	Index	Rev. has affinities with L_B
	Hertfordshire				
TL 39.24	Braughing district	1 Æ/R	New types	*Seaby CAMB*, Oct. 1976: 279:81 Nos 1–2	
		1 Æ/R			

	Kent				
TR 15.58	Canterbury, 1980, Marlowe	1 Æ	New type	Index	Cf. gold M.270–1
TQ 70.61	Snodland	1 Æ	New type	Inf. D. B. Kelly	Silver version of Æ Lx 21. Cf. Harlow No. 15 (Haselgrove, 1978: 34)
	Norfolk				
TG 37.09	Burlingham	1 Æ	Lx10 var.	A. Gregory (pers. comm.)	
TF 66.24	Castle Rising	1 Æ	Lx10 var.	A. Gregory (pers. comm.)	
TF 593006	Denver	1 Æ	Lx10 var.	A. Gregory (pers. comm.)	
TF 76.02	Gooderstone	1 Æ	Lx10 var.	A. Gregory (pers. comm.)	
TL 735874	Hockwold-cum-Wilton	1 Æ	Lx10 var.	A. Gregory (pers. comm.)	
	Suffolk				
TL 77.72	Icklingham, 1978	1 Æ	Lx10	R. A. Brown (pers. comm.)	
TL 71.82	Lakenheath, 1982, Stallard's Drive	1 Æ	Lx8	Index	
TL 70.74	Mildenhall, 1980	1 Æ	Lx10	Index	Hoard stray?

BRITISH L_X – BRONZE

	Kent				
TR 15.58	Canterbury, 1978 Cakebread Robey	1 Æ	Lx22 var.	D. Nash (pers. comm.)	Rev. horse right. Inscribed above K [?
	Norfolk				
TF 89.00	Saham Toney, 1977, Woodcock Hall	1 Æ	Lx21	R. A. Brown (pers. comm.)	
		1 Æ	Lx23		
	Northamptonshire				
SP 885817	Weekley, 1978	1 Æ	Lx22	Index	

Correction
Delete: 1 Æ cf. Lx Harlow Holbrooks (Haselgrove, 1978: 36) and see Miscellaneous Gaulish – Bronze

BRITISH L_Y – BRONZE

	Kent				
TQ 718666	Borstal, 1983 or before, on the marshes	1 Æ	New type	Inf. D. B. Kelly	Cf. Dubnovellaunus M. 286. See *Potin*
TR 15.58	Canterbury, 1978, Cakebread Robey	1 Æ	Ly7	D. Nash (pers. comm.)	
	1979–80 Marlowe	1 Æ	Ly6		
		1 Æ	Ly7		
		1 Æ	New type		Cf. M.298, etc.

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
		BRITISH LZ – GOLD			
	Hampshire				
SU 724029	Hayling Island, 1978	1 Æ /A	Lz1	D. Nash (pers. comm.)	
	Temple	1 Æ /A ¼	New type		
		1 Æ /A ¼	New type		
	Sussex				
SZ 838934	Selsey, 1873 or after	1 A ¼	Lz4	Willett, 1879: 86	Hoard 18
		10 A ¼	Lz5		
		7 A ¼ in hoard	Lz6		
		BRITISH Lz – SILVER			
	Berkshire				
SU 823778	Waltham St Lawrence,	3 AR	New type	J. P. C. Kent	Hoard 81
	1977, Weycock Hill, Temple	1 AR in hoard	M. 375	(pers. comm.)	
	Hampshire				
SU 724029	Hayling Island, 1977, Temple	1 Æ /AR	New type	D. Nash (pers. comm.)	
	1978, Temple	1 AR¼	M372 CRAB		
	1979, Temple	2 AR	New types		Head/horse types
	1980, Temple	1 AR	New type		Head, pattern/horse type
		1 Æ /AR	New type		Head, pattern/horse type
SU 74.23	Petersfield, near, 1982	1 AR	New type	Index	Affinities with M.86
	Sussex				
SU 85.23	Iping, 1977–8, Common	1 AR	New type	D. Nash (pers. comm.)	
TQ 08.06	Patching, 1978,	1 AR	New type	Index	Head/horse type
	Myrtlegrove Farm				
		BRITISH M			
	Hampshire				
SZ 170908	Hengistbury Head, 1980	1 A	M_B	Seen B.M.	
	Wiltshire				
SU 205689	Mildenhall, 1977,	1 A	M_B	Index	
SU 218620	Savernake Forest,	1 A	M_B		
	Brown's Farm				

		BRITISH N			
	Norfolk				
TM 35.91	Broome, 1980	1 *N* ¼	N_D	A. Gregory (pers. comm.)	Known site
TF 887003	Saham Toney, 1977, Woodcock Hall	1 *N*	N_A	R. A. Brown (pers. comm.)	
		1 *N* ¼	N_D	R. A. Brown (pers. comm.)	
	Suffolk				
TM 00.73	Wattisfield, 1980	1 *N*	N_A	Index	
		BRITISH O			
	Berkshire				
SU 660725	Tilehurst, 1979, near Blagrove Hospital	1 *N* ¼	O	D. Nash (pers. comm.)	
	Hampshire				
SZ 17.91	Bournemouth, near, 1980	3 *N* ¼	O	Seen B.M.	Hengistbury Head?
SU 58.28	Cheriton, 1982	2 *N* ¼, in hoard	O	Seen B.M.	See *British D*
SU 724029	Hayling Island, 1977, Temple	4 *N* ¼	O	D. Nash (pers. comm.)	
	1978, Temple	2 *N* ¼	O		
	1979, Temple	1 Æ /*N* ¼	O?		Gold version of Durotriges Æ¼, M.319?
		BRITISH P			
	Kent				
TQ 777511	Boughton Monchelsea	1 *N* ¼	P_A	Inf. D. B. Kelly	
		BRITISH Q			
	Berkshire				
SU 823778	Waltham St Lawrence, Weycock Hill, Temple	4 *N*	Q_A	J. P. C. Kent (pers. comm.)	Hoard 81
		1 Æ /*N*, in hoard			
	Gloucestershire				
SO 833000	Nailsworth, 1981, Forest Green	1 *N* ¼	Q_C	Index	
	Hampshire				
SU 36.45	Andover, near, 1982 Finkley Down	4 *N* in hoard	Q_A	Index	See *Tincommios* and *Verica*
SU 724029	Hayling Island, 1977, Temple	2 Æ /*N*	QA	D. Nash (pers. comm.)	One is closer in some respects to Q_C or Commius.

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Norfolk				
TF 887003	Saham Toney, 1982 or before, Woodcock Hall	1 *N* ¼	Q_C	Index	
	Suffolk				
TL 86.46	Long Melford, 1982	1 *N*	Q_A	Shown B. M.	
	Long Melford, 1980	1 *N* ¼	Q_C	Index	
	Surrey				
SU 84.46	Farnham, 1980, Farnham Park	4 *N*, in hoard	Q_A	Index, M. Millett (pers. comm.)	Scattered hoard. See *Gallo-Belgic E*
	Sussex				
SU 842035	Apuldram, 1982 or before, Apuldram Farm	1 *N*	Q_A	Index	E above horse, cf. coin from Balsdean, Brighton, 1896. See also *Tincommios*
SU 83.05	Fishbourne, 1976, Barker Close	1 *N* ¼	Q_C	Index	
SZ 838934	Selsey, 1873 or after	1 *N*	Q_A	Willett, 1879: 86	Hoard 18, etc.
		2 *N*	Q_B	Allen, 1960, 290	
		1 *N* ½	Q_C		
Continental					
	France				
	Villeneuve-St-Germain, Aisne	1 *N*	Q_A	J. Desbord (pers. comm.)	Excavation of late Iron Age nucleated settlement

Correction
The 2 *N* staters reported from Henrichemont, Cher, and Levroux, Indre, as possible British Q_A staters are both in fact Gallo-Belgic F, i.e. Scheers No. 26 Class 3 (Haselgrove, 1978: 44)

POTIN

	Buckinghamshire				
SP 840155	Bierton, 1979, near Aylesbury	1 Potin	P	Index	
SP 862072	Wendover, 1981 or before	1 Potin	H	Index	
	Essex				
TQ 761938	Wickford	2 Potin	Class II	Rodwell, 1976	
	Hampshire				
SU 467279	Winchester, near, 1979, Oliver's Battery	2 Potin	G, Uncertain Class I	Index	
	Hertfordshire				
TL 39.25	Braughing, 1979, Gatesbury track	2 Potin	M, P	Index	From pit and ditch respectively

TL 39.24	Puckeridge, before 1979 Station Road	1 Potin	Class II?	Index	From late Iron Age ditch; fragment
	Huntingdonshire				
TL 23.71	Huntingdon, near, 1982	1 Potin?	Uncertain	Shown B.M.	
	Kent				
TR 189539	Bridge, 1960, Bridge Hill	1 Potin	Class I	Allen, 1971:146, as Class I	
TQ 718666	Borstal, 1983, or before	1 Potin	A?	Index	Found on marshes
TQ 786593	Boxley, 1983, The Warren	19 Potin, in hoard	G(4), J(3), L(5), uncertain Class I?	Inf. D. B. Kelly	Most of the coins are fractions or fragments
TQ 786593	Boxley, 1981, The Warren	1 Potin	C	Inf. D. B. Kelly	Found at same spot as hoard: presumably a stray
TR 15.58	Canterbury, 1979, St Margaret's Street	10 Potin	J(2), L(2), O(3), Class II (3)	Index	Excavations
	Canterbury, 1979–80, Marlowe	17 Potin	L(4), M(4), O(3), P(1), Class I(2), Class II(3)	Index	Excavations
TQ 56.71	Darenth, before 1982, Gravel pit	1 Potin	Class I	Index	
TR 31.41	Dover, 1971, Top Road	1 Potin	O	Index	Excavations
	Dover, 1972, Market Street	1 Potin	M	Index	Excavations
TQ 55.66	Farningham, 1975, Farningham Hill	1 Potin	L	Index	Kent Motorway's Site 12
TR 23.36	Folkestone, near, 1982 or before	64 Potin in hoard	A	Index	
TQ 84.55	Hollingbourne, 1977	1 Potin	A	Index	
TQ 41.64	Keston, 1972, Lower Warbank	2 Potin	L, O	Index	Excavations
	Northview, before 1982	1 Potin	D	Index	Kent Motorway's Site 8
		1 Potin?	Uncertain		Or could be Æ coin?
TR 38.65	Ramsgate, near, 1982	1 Potin	A	Shown B.M.	
TR 325566	Sandwich, 1979	1 Potin	P	Index	Excavations
TQ 70.61	Snodland, 1980, sand pit	1 Potin	M	Index	In ditch fill
TQ 55.70	Sutton-at-Home, 1970–1	1 Potin	Class I or II	Noted by author	Late Iron Age site
TQ 53.72	Wilmington, before, 1982, gravel pit	1 Potin	G	Index	Excavations

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Middlesex				
TQ 18.77	Brentford, 1978, Thames foreshore	1 Potin	Class II	D. Nash (pers. comm.)	
	Norfolk				
TM 44.97	Haddiscoe, in the 1930s, near the village	Sev. Potin	Class I or II	A. Gregory (pers. comm.)	A small hoard? Now lost
	Somerset				
ST 447423	Meare, 1982, Meare East 'Lake Village'	1 Potin	O	*Somerset Levels Papers*, **9**: 70	Excavations
	Surrey				
TQ 37.63	Addington, before 1982	3 Potin	M, O, P	Shown B.M.	
TQ 22.76	Barnes, 1982 or before Thames foreshore	1 Potin	Class I or II	Index	
TQ 005386	Hascombe, 1977, Hillfort	3 Potin	Class I	H. Thompson (pers. comm.)	Hoard 84
TQ 25.75	Wandsworth, 1977, from the Thames near Putney Bridge	6 Potin in hoard	J–L	Glendining, 20.9.1978, lot 67	Hoard 84
	Sussex				
TQ 468009	Bishopstone, 1973–5, Rookery Hill	2 Potin	Class I or II	Bell, 1978	
	Worcestershire				
SO 984364	Beckford, 1980	2 Potin	Class I	Inf. J. Wills	Excavations
Continental					
	France				
	Chilly, Somme, 1980	1 Potin, in hoard	L	*Revue Archéologique de Picardie*, **4**: 92–118	See also *Gallo-Belgic C*
			TINCOMMIUS		
	Berkshire				
SU 823778	Waltham St Lawrence, Weycock Hill Temple	1 Æ N	96	J. P. C. Kent (pers. comm.)	Hoard 81
		2 N	100		
		1 N ¼	95		
		1 N ¼	104		
		1 R	New type		
		1 R in hoard	New type		

	Hampshire				
SU 36.45	Andover, near, 1977 or before, Finkley Down	5 Ⱥ, in hoard	98(2), 100(3)	Seen B.M.	See *British Q* and *Verica*
SU 724029	Hayling Island, 1978–80, Temple	2 Æ/Ⱥ	100	D. Nash (pers. comm.)	Excavations
		1 Æ/Ⱥ	104		
		1 Æ/Ⱥ ¼	97		
		2 Ⱥ	131B		
		1 Ⱥ	cf. 106 but reversed		
SU 64.62	Silchester, 1982 or before	1 Ⱥ	131B	D. Nash (pers. comm.)	Cf. Hayling Island
SU 48.29	Near Winchester, before 1859	1 Ⱥ	94	Noted	
	Surrey				
SU 84.46	Farnham, 1880 or before	1 Ⱥ	96	Letter to G. Payne in Rochester Museum	
	Sussex				
SU 842035	Apuldram, 1982 or before, Apuldram Farm	2 Ⱥ	94	Index	See *British Q*
TQ 31.05	Brighton	1 Ⱥ	131 B	Index	
SU 803186	Little Harting, 1941	1 Ⱥ ¼	New type	Allen, 1960: 269, as *Miscellaneous J*	
SZ 838934	Selsey, 1873 or after	1 Ⱥ	94	Willett, 1879: 87, Allen, 1960: 290	Hoard 18
		10 Ⱥ ¼	101–4		
SZ 78.97	Wittering, before 1890	1 Ⱥ ¼	99	Evans, 1890: 503	
Correction Delete:	Tichborne, Ganders Down	1 Ⱥ	96	(Allen, 1960: 209)	Repeat of Fareham, Tichfield Down, before 1843, 1 Ⱥ 96

VERICA

	Berkshire				
SU 66.67	Burghfield, 1982, Pingewood	1 Ⱥ	115	Shown B.M.	
SU 90.82	Maidenhead, 1978, near the Thames	1 Ⱥ	115	Index	
SU 82.78	Middle Thames Valley, 1977	1 Ⱥ ¼	112	Birmingham M.	Part of the Waltham St Lawrence board? See *Epillus*
		1 Ⱥ in hoard?	New type		

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
SU 82.78	Thames gravels, 1976	3 AR	115	G. C. Boon (pers. comm.)	Part of the Waltham St Lawrence hoard? These numbers are a minimum figure
		1 AR	118		
		3 AR	123		
		1 AR	128		
		4 AR	131		
		1 AR	131 B		
		1 AR	New type		
		1 AR ¼	cf. 129		
		1 AR ¼, in hoard?	New type		
SU 823778	Waltham St Lawrence, 1977, Weycock Hill	8 AV ¼	112	J. P. C. Kent (pers. comm.)	Hoard 81
		6 AV ¼	113		
		2 AV ¼	114		
		11 AR	128		
		6 AR	New type		
		2 AR	115		
		3 AR	123		
		10 AR	131		
		1 AR	129		
		2 AR	New type		
		1 AR ¼	132		
		1 AR ¼	New type		
		1 AR ¼	New type		
		1 AR ¼	New type of 129		
		2 AR ¼ in hoard	New type		
	Buckinghamshire				
SP 80.03	Princes Risborough, near, 1982 or before, 'The Cup'	1 AR ¼	132	Shown B.M.	
	Hampshire				
SU 36.45	Andover, near, 1982 or before, Finkley Down	1 AV, in hoard	110	Seen B.M.	See *British Q* and Tincommios
SU 58.32	Near Alresford, 1899, Avington	1 AV	121	Allen and Haselgrove, 1979, No. 32	

SU 66.40	Bentworth, 1880 or before	1 *AN* 2 *AN*	121 125	Letter to G. Payne in Rochester Museum	The true findspot of the Alresford Hoard. See *BNJ*, **50**: 131–2.
SU 724029	Hayling Island, 1977, Temple	1 *AR* ¼	117	D. Nash (pers. comm.)	
		1 Æ/*AR* ¼	118		
	Hayling Island, 1978, Temple	1 Æ/*AR*	131		
		1 Æ/*AR*	New type		
		1 *AR* ¼	New type		
	Hayling Island, 1979–80, Temple	1 Æ/*AN*	121	D. Nash (pers. comm.)	
		1 Æ/*AN*	125		
		1 Æ/*AR*	128		
		1 Æ/*AR*	129		
		2 Æ/*AR*	131		
		1 *AR* ¼	New type cf. 124–5		
		1 Æ/*AR* ¼	New type		
	Kent				
TR 15.58	Canterbury, 1980 Marlowe	1 *AR* ¼	120 A–C	Index	
	Norfolk				
TF 889006	Saham Toney, 1982 or before, Woodcock Hall	1 Æ/*AN*	109	Index	
	Sussex				
TQ 51.03	Alfriston, near, 1979	1 *AR*	115	Index	
TV 58.95	Beachy Head, 1978, Bullock Down	1 *AR*	121	Index	
SZ 838934	Selsey, 1873 or after	1 *AN* ¼	112	Willett, 1879: 87	Omitted by Evans, 1890: 512; on purpose?
Correction					
	Yorkshire				
Delete:	Keighley, *c.* 1889	1 *AN* 121	(Allen, 1960: 212)	Probably *Coritani – Inscribed*	(Allen and Haselgrove, 1979: 14)
			EPPILLUS		
	Berkshire				
SU 82.78	Middle Thames Valley, 1977	1 *AN* ¼	107	Birmingham M.	
		1 Æ	New type		Obv: dog. Rev: pattern. Part of Waltham St Lawrence hoard?

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
SU 82,78	Thames gravels, 1976	2 AV ¼	107	Some Nat. Mus. of Wales	Part of Waltham St Lawrence hoard? Minimum figures
		4 AR, in hoard?	108		
SU 823778	Waltham St Lawrence, 1977, Weycock Hill Temple	9 AV ¼	107	J. P. C. Kent (pers. comm.)	Hoard 81
		5 AV ¼	302		
		1 AV ¼	New type		
		1 AR, in hoard	108		
	Kent				
TR 15.58	Canterbury, 1980, Marlowe	1 Æ	New type	D. Nash (pers. comm.)	Obv: Bull. Rev: Eagle. Excavations
		1 Æ	312		
		DUBNOVELLAVNVS (Kent)			
	Kent				
TR 15.58	Canterbury, 1978, Cakebread Robey	2 Æ	New type, cf. 291	D. Nash (pers. comm.)	Excavations
	Canterbury, 1978, 1B Watling Street	1 Æ	291		
	Canterbury, 1980, Marlowe	1 Æ	289		
		1 Æ	New type, cf. 291		
	Canterbury, 1979, Ingoldsby Road	1 AR	New type		
	Norfolk				
TF 887003	Saham Toney, 1977, Woodcock Hall	1 AR	286	R. A. Brown (pers. comm.)	
		DUBNOVELLAVNVS (Essex)			
	Cambridgeshire				
TL 609729	Soham, 1980, by-pass route	1 AV	275	Index	Iron Age and Roman site
	Essex				
TL 992252	Colchester, Balkerne Lane	1 Æ	278	Information P. Sealey	Found in soil redeposited from Balkerne Lane
	Kent				
TQ 87.71	New Chitney Island, 1977, below high water mark	1 AV	275a	Noted by author	Found with plated Republican denarius
TR 15.58	Canterbury, 1978, Cakebread Robey	1 Æ	New type	D. Nash (pers. comm.)	Cf. 274, but horse to right

	Norfolk				
TF 883003	Saham Toney, 1977, Woodcock Hall	1 Æ	278	R. A. Brown (pers. comm.)	
TL 87.83	Thetford, 1982	1 Æ	New type	A. Gregory (pers. comm.)	Roman site
			ADDEDOMAROS		
	Norfolk				
TL 938840	Brettenham, 1979	1 Æ ½	280 C	A Gregory (pers. comm.	C.f. Æ ½ found at Colchester
TF 887003	Saham Toney, 1977, Woodcock Hall	1 Æ	274 A	R. A. Brown (pers. comm.)	
	Wiltshire				
SU 003712	Calne, 1976, Page Close	1 Æ	267	Shown B.M.	
			TASCIOVANVS		
	Bedfordshire				
TL 04.49	Bedford, 1982 or before	1 Æ	cf. 170	Index	Roman site
SP 956568	Odell, 1976	1 Æ	174	Index	Excavations
		1 Æ	179		
	Odell, 1977	2 Æ	170	Index	
		1 Æ	172		
		1 Æ	182		
	Buckinghamshire				
SP 82.14	Near Aylesbury, 1977, Walton Court	1 Æ	165	D. Nash (pers. comm.)	Shown Ashmolean Museum
	Cambridgeshire				
TL 44.59	Cambridge, near, 1982 or before	1 Æ	178	Index	
TL 443594	Cambridge, 1974–6, Castle Hill	1 Æ	167	Noted by author	
		1 Æ	178		
	Cambridge, 1974–7, Castle Hill	1 Æ	New type	Noted by author	
TL 39.86	Chatteris, 1982 or before	1 Æ	166	Index	
	Essex				
TL 99.25	Colchester, 1975, Balkerne Lane	1 Æ	Uncertain	Index	Excavations
TL 987253	Colchester, 1970, Sheepen	1 Æ	192	Index	or *Cunobelinvs*

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
TL 47.13	Harlow, 1982 or before, Temple?	1 Æ	167	Index	
	Hertfordshire				
TL 38.25	Braughing district	1 Æ ½	New type	*Seaby CAMB*, Oct. 1976: 279–81, No. 3	
TL 15.07	Near St Albans, 1979, or before	1 Æ	188	Index	*Seaby CAMB, April 1978*, E134
		1 Æ	193		
SP 958102	Tring, 1978 or before, Cow Roast Marina site	1 Æ	193	Index	
	Kent				
TR 33.47	Langdon, before 1775	1 Æ	155	Index	
	Norfolk				
TF 905055	Ashill, 1979–80	1 Æ/Æ	149	A. Gregory (pers. comm.)	
TF 909057	Ashill, 1979–80	1 Æ	172	A. Gregory (pers. comm.)	
TM 33.91	Ditchingham, 1982–3, Wainford	1 Æ	162	A. Gregory (pers. comm.)	
TF 889006	Saham Toney, 1976 Woodcock Hall	1 Æ	170	A. Gregory (pers. comm.)	
	Northamptonshire				
TL 048893	Ashton, 1978	1 Æ	192	Index	
	Oxfordshire				
SU 535872	Radley, 1979, or before, Thrupp House Farm	1 Æ	189	D. Nash (pers. comm.)	Excavations
SP 389386	Swalcliffe Lea	1 Æ	168 var.	D. Nash (pers. comm.)	Shown Ashmolean M.; Horse to right
			CUNOBELINVS		
	Bedfordshire				
TL 04.49	Bedford, 1982, Cut Throat Allotments	1 Æ ¼	204	Shown B.M.	
SP 956568	Odell, 1976	1 Æ	236	Index	
		1 Æ	230		
		1 Æ	Uncertain		Or *Dubnovellavnvs*
	Odell, 1977	1 Æ	221	Index	
		1 Æ	244		
		1 Æ	248		
		2 Æ	249		

	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Weycock Hill	2 AR in hoard	237	J. P. C. Kent (pers. comm.)	Hoard 81
	Buckinghamshire				
SU 85.87	Marlow, near, 1981	1 AV	203	Shown B.M.	
SP 86.36	Milton Keynes, 1981, Down Barn	1 AV ¼	206	Shown B.M.	
	Cambridgeshire				
TL 66.69	Chippenham, 1982 or before	5 AV in hoard?	203	Index	One coin is pierced, two others have been clipped. Presumably from the same source?
	Chippenham, 1982 or before	1 Æ in hoard?	253		
TL 59.73	Soham	1 Æ	222	Index	
	Essex				
TL 76.22	Braintree, 1982 or before	1 Æ	cf. 225	Index	
TL 66.10	Chignall	1 Æ	225	Index	
		1 Æ	231		
		1 Æ	251		
TL 987253	Colchester, 1835, Union House	2 AV		Allen, 1960: 292	Hoard 28. See also *Inadequately Recorded Coins*
		1 AV ¼			
		2 Æ, in hoard	245?		
TM 00.25	Colchester, near	1 AV	201	Index	
TL 99.25	Colchester, 1949 or before	1 Æ	222	Index	
	Colchester, 1927–8	1 Æ	248	Index	
		1 Æ	251		
	Colchester, 1942 or before	1 Æ	252	Index	
	Colchester, 1974, Balkerne Lane	1 Æ	250	Index	Excavations
TL 987253	Colchester, 1958 or before, Sheepen Road	1 Æ	222	Index	Pits at new Technical College
		1 Æ	251		
	Colchester, 1958 or before, Sheepen Allotments	1 Æ	227	Index	Or Mack, 243?
		2 Æ	251		
	Colchester, 1937, Sheepen School	1 Æ	248	Index	Omitted from Excavation Report
	Colchester, 1930–1, Sheepen	1 Æ	224	Index	Omitted from Excavation Report?
		1 Æ	230		
		1 Æ	253		
		1 Æ	260		
	Colchester, 1961, Sheepen Temple	1 Æ	252	Index	Excavations

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
TL 987253	Colchester, 1970, Sheepen	1 Æ	231	Index	Omitted from Haselgrove, 1978: 67–8
		1 Æ	251		
		4 Æ	252		
		1 Æ	260		
TL 987253	Colchester, 1971, Sheepen	1 Æ	231	Index	
TL 99.25	Colchester, near, 1982 or before	1 Æ	New type	Index	Obv. cf. *AR Amminivs*. Rev. standing figure with club.
		1 Æ	New type	Index	Obv. CAMV in panel. Rev. seated figure drinking.
TM 02.20	Fingringhoe, 1934, at foot of cliff	1 Æ	248	Index	
		2 Æ	251		
TL 628216	Great Dunmow	1 Æ	253	Index	Excavations
TL 47.13	Harlow, 1982	1 Æ ¼	204 var.	Index	
TQ 63.91	Herongate, 1979	1 Æ ¼	204	Index	
TL 86.18	Kelvedon, 1960	1 Æ	251	Index	
	Kelvedon, 1970	1 Æ	215		Excavations
TQ 38.86	Leyton, 1977	1 Æ	211	Index	
	Hertfordshire				
TL 38.24	Puckeridge, 1978, Station Road	1 Æ	cf. 225	Index	Excavation finds. From late Iron Age ditch
		1 Æ	244		
		1 Æ	253		
SP 958102	Tring, 1978 or before, Cow Roast Marina site	3 Æ	248	Index	
SP 958102	Tring, 1979, Cow Roast Esso site	1 Æ	246	Index	
		1 Æ	248		
TL 353145	Ware, 1979 or before, Allen and Hanbury site	1 Æ	229	Index	
	Kent				
TQ 718666	Borstal, 1982 or before	1 Æ	cf. 233(a)	Index	Found on marshes. See *Potin*
TR 15.58	Canterbury, 1982, 77–9 Castle Street	1 Æ	Type cf. Muckelroy *et al.*, 1978	Index	Rev. ship
TR 15.58	Canterbury, 1978, Cakebread Robey	1 Æ /Æ	210	D. Nash (pers. comm.)	
		1 Æ	260a		
TR 24.37	Folkestone, 1982, East Cliff	1 Æ	222	Index	
TQ 42.65	Keston, 1979 or before, Common	1 Æ ¼	204	Stanley Gibbons, 6.6.1979	
TQ 76.55	Near Maidstone, 1979	1 Æ /Æ	201	D. Nash (pers. comm.)	Shown Maidstone M.

	Norfolk				
TM 33.91	Ditchingham, 1982–3, Wainford	1 Æ	224	A. Gregory (pers. comm.)	Roman site
TF 68.06	Fincham, 1983	1 N ¼	Linear	A. Gregory (pers. comm.)	Roman site
TF 897003	Saham Toney, 1977–8	1 Æ	252	R. A. Brown	
	Woodcock Hall	1 Æ	243	(pers. comm.)	
	Saham Toney, 1976	1 Æ	223	R. A. Brown (pers. comm.)	Roman site
TL 865847	Thetford, 1981, Gallows Hill	1 Æ	251	A. Gregory (pers. comm.)	Excavation of client kingdom enclosure site
	Northamptonshire				
SP 59.36	Brackley	1 Æ	242	D. Nash (pers. comm.)	
SP 72.60	Old Duston, 1950, Weedon Road	1 Æ	245	Christie:s, 4.10.1977, lot 69	
	Oxfordshire				
SP 58.22	Bicester, near, 1982	1 Æ	244	Index	
SU 58.94	Dorchester on Thames, 1977	1 Æ	248	D. Nash (pers. comm.)	Shown Ashmolean M.
SP 56.20	Near Oxford, 1977, Wendlebury	1 Æ	244	D. Nash (pers. comm.)	
	Suffolk				
TM 25.45	Ipswich, 1982, Martlesham Heath	1 N ¼	209?	Shown B.M.	
TL 71.82	Lakenheath	1 N	203	*Seaby Coins and Medals Bulletin*, April 1977: A930	Hoard stray?
	Sussex				
SU 86.05	Chichester, 1974, Chapel Street	1 Æ	260	Down, 1978: 330 *Sussex Arch Coll*, 90 (1951–2): 219 f)	
	Chichester, 1974, North Street	1 Æ	248		
	Warwickshire				
SP 095573	Alcester, 1977 or before, beside the river	1 R	237	D, Nash (pers. comm.)	Shown Ashmolean M.

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Wiltshire				
ST 890871	Near Malmesbury, 1977, Easton Grey	1 Æ?	Uncertain	Robinson, 1978: 7, note 6	
	Yorkshire				
SE 98.26	North Ferriby, 1981	1 Æ	221	Shown B.M.	
			EPATTICVS		
	Berkshire				
SU 82.78	Thames gravels, 1976–7	2 ÆR 4 ÆR, in hoard?	263 263 A	N. M. Wales, Birmingham M.	Part of Waltham St Lawrence hoard? Minimum figures
SU 823778	Waltham St Lawrence, Waycock Hill Temple	43 ÆR 11 ÆR 1 ÆR ¼ 1 ÆR ¼, in hoard?	263 263a 264? New type	J. P. C. Kent (pers. comm.)	Hoard 81
	Hampshire				
SU 924029	Hayling Island, 1977, Temple	1 Æ/ÆR	263	D. Nash (pers. comm.)	
	Surrey				
SU 84.41	Frensham, 1982, The Manor	1 ÆR	263A	Shown B.M.	
	Wiltshire				
ST 890871	Near Malmesbury, 1977, Easton Grey	1 Æ/ÆR	263	Robinson, 1978: 7, note 6, as Mack, 363.	
			CARATACVS		
	Berkshire				
SU 82.78	Thames gravels, 1976	1 ÆR 1 ÆR ¼, in hoard?	265 New type	*London Archaeologist* 3 (1978): 195	Part of Waltham St Lawrence hoard?
SU 823778	Waltham St Lawrence 1977, Weycock Hill Temple	3 ÆR 2 ÆR ¼, in hoard	265 New type	J. P. C. Kent (pers. comm.)	Hoard 81

		ADMINIVS			
	Kent				
TR 15.58	Canterbury, 1978, Cakebread Robey	1 Æ	New type	D. Nash (pers. comm.)	Obv. Panel AM in wreath. Rev. DVNO
	Wiltshire				
SU 080876	Purton, Pavon Hill	1 Æ	New type	Index	Same as Canterbury type
		A? MINIMS			
	Hampshire				
SU 724029	Hayling Island, 1977, Temple	1 AR ¼	316	D. Nash (pers. comm.)	
		HAMPSHIRE – THIN SILVER			
	Hampshire				
SU 724029	Hayling Island, 1977–8 Temple	5 AR	321	D. Nash (pers. comm.)	
		MISCELLANEOUS – BRITISH AND GAULISH			
	'Belgic' Affinity				
	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Waycock Hill, Temple	1 AR 1 AR, in hoard	87 87A	J. P. C. Kent (pers. comm.)	Hoard 81
	Hampshire				
SU 724029	Hayling Island, 1977–8, Temple	1 AR 1 AR	87 87A var.	D. Nash (pers. comm.)	
	Kent				
TQ 762601	Boxley	1 AR	New type	Inf. D. B. Kelly	
TR 15.58	Canterbury	1 AR	New type	D. Nash (pers. comm.)	Cf. Scheers No. 43. Excavations
	Wiltshire				
ST 890871	Malmesbury, near, 1977, Easton Grey	1 AR	New type	Robinson, 1977:17	
	'Armorican' Affinity				
	Dorset				
SU 017177	Wimborne St Giles, 1982, Oakley Down	1 AR	320	M. Corney (pers. comm.)	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Hampshire				
SU 724029	Hayling Island, 1977, Temple	1 Æ	New type	D. Nash (pers. comm.)	
SU 724029	Hayling Island, 1978–80, Temple	1 Æ	320	D. Nash (pers. comm.)	Excavations
	Other Thin Silver				
	Hampshire				
SU 724029	Hayling Island, 1977,	1 Æ	New type	D. Nash (pers. comm.)	
	Temple	1 Æ	New type		
	Hayling Island, 1978	1 Æ	New type		
	Temple	1 Æ	New type		
	Hayling Island, 1980, Temple	1 Æ	New type	D. Nash (pers. comm.)	Excavations
SZ 170908	Hengistbury Head, 1980	1 Æ	New type	Noted by author	Akin to 321. Excavations
		DUROTRIGES – UNINSCRIBED Æ, Æ/Æ, Æ			
	Devon				
SZ 918927	Exeter, 1978, city wall	1 Æ	318	*Britannia* X: 324	Or Æ 317
	Dorset				
SY 69.90	Dorchester, 1895–1935	4 Æ	317	Gunstone, 1977, Nos. 62, 65–7	Or Æ 318
SY 68.89	Dorchester, near, 1982	Several Æ/Æ in a scattered hoard	318	P. J. Casey (pers. comm.)	
SY 68.89	Dorchester, near, 1982	Several Æ¼	319	P. J. Casey (pers. comm.)	
ST 990140	Gussage St Michael, 1982, Cow Down	2 Æ	317	M. Corney (pers. comm.)	
ST 875125	Hambledon Hill, 1977	1 Æ	317	R. Palmer (pers. comm.)	
ST 988162	Sixpenny Handley, 1982, Manor Farm	4 Æ	318	M. Corney (pers. comm.)	
ST 927118	Tarrant Hinton, 1981,	3 Æ/Æ	317–8	Index	
	Barton Field	1 Æ ¼	319		
SY 968784	Worth Matravers, 1979	1 Æ	317	Shown Poole M.	

SU 017177	Wimborne St Giles, 1982, Oakley Down	5 Æ	318	M. Corney (pers. comm.)	
	Gloucestershire				
ST 78.98	Uley, 1977, West Hill, Roman temple	1 Æ	318	L. Sellwood (pers. comm.)	A. Ellison excavations
	Hampshire				
SZ 17.91	Bournemouth, near, 1978	3 Æ /Æ	318	Shown B.M.	Prob. Hengistbury Head
	Bournemouth, 1978–80	2 Æ ¼	319	Seen B.M.	
SU 724029	Hayling Island, 1977–8	6 Æ	317	D. Nash (pers. comm.)	
	Hayling Island, 1978, Temple	3 Æ /Æ	318	D. Nash (pers. comm.)	
	Hayling Island, 1979	2 Æ	317	D. Nash (pers. comm.)	Excavations
	Hayling Island, 1980	2 Æ	318		
	Hayling Island, 1980	1 Æ	317		
SZ 170908	Hengistbury Head, *c.* 1913	6 Æ	317	Index	
	Hengistbury Head, 1911–22	20 Æ	317	M. Mays (pers. comm.)	
		6 Æ ¼	319		
	Hengistbury Head, 1918–24	3 Æ	317	Cunliffe, 1978: 88	
		1 Æ ¼	319	B. W. Cunliffe (pers. comm.)	
	Hengistbury Head, 1979, harbour edge	1 Æ	317	Noted by Author	
SZ 170908	Hengistbury Head, 1911–16	16 Æ	318	M. Mays (pers. comm.)	Red House M.
	Hengistbury Head, 1911–15	66 Æ	318	Index	Bournemouth M.
	Hengistbury Head, 1918–24	6 Æ	318	Cunliffe, 1978: 88	
	Hengistbury Head, before 1947	1 Æ	318	*Sylloge*, 21, No. 899	
SZ 15.91	Southbourne, 1912, Pokesdown Cliffs	1 Æ	318	M. Mays (pers. comm.)	Red House M.
SU 48.29	Winchester, 1926 or before Corn Exchange	1 Æ	318?	Allen, forthcoming	
SU 48.29	Winchester, 1939. Little Minster Street	1 Æ	318?	Allen, forthcoming	
SU 48.29	Near Winchester	4 Æ	318	Allen, forthcoming	
SU 48.29	Near Winchester	1 Æ	317	Allen, forthcoming	
	Norfolk				
TF 897003	Saham Toney, 1977, Woodcock Hall	2 Æ	318	R. A. Brown (pers. comm.)	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Somerset				
ST 755644	Bath, 1979–80, Temple Precinct	1 Æ ¼	319	L. Sellwood	
		1 Æ /Æ	318	(pers. comm.)	
		2 Æ	318		
ST 68.57	Camerton, 1982	1 Æ	317	Index	
		1 Æ ¼	319		
ST 332477	Wookey Hole, in cave porch	1 Æ	317	Gunstone, 1977, No. 149	
	Sussex				
SU 86.05	Chichester, 1974, NW Quadrant	1 Æ	318	Index	
SZ 838934	Selsey, 1873, or after	1 Æ	317	Willett, 1879: 87	Omitted by Evans, 1890
	Wiltshire				
ST 833387	Brixton Deverill, 1979 or before	1 Æ	317	D. Nash (pers. comm.)	Shown Ashmolean M.
ST 813733	Colerne, in 1960s	1 Æ /Æ in scattered hoard	318	*Wilts Arch Nat Hist Mag*, 1981: 83 f	
ST 84.36	Kingston Deverill, before 1981	1 Æ ¼	319	*Wilts Arch Nat Hist Mag.* 1981: 83 f	
SU 20.69	Mildenhall, near, before 1981	1 Æ /Æ	318	*Wilts Arch Nat Hist Mag.* 1981: 83 f	
ST 972362	Stockton, 1979 or before, earthworks	2 Æ	317	D. Nash (pers. comm.)	Shown Ashmolean M.
ST 83.39	Near Warminster, 1977	1 Æ	317	P. Robinson (pers. comm.)	Possibly Cold Kitchen Hill
ST 86.44	Warminster, near, before 1981	1 Æ /Æ	318	P. Robinson (pers. comm.)	
Correction Delete:	Waddon Hill	Æ	317	1965 (Haselgrove, 1978: 85)	One coin of this type only
		DUROTRIGES – UNINSCRIBED CASTÆ			
	Hampshire				
SZ 16.93	Christchurch, 1912, The Quay	1 Æ	Cast	M. Mays (pers. comm.)	Red House M.

SZ 170908	Hengistbury Head, *c.* 1912	19 Æ	Cast	M. Mays (pers. comm.)	Red House M.
	Hengistbury Head, 1911–16	16 Æ	Cast	Index	Bournemouth M.
	Hengistbury Head 1918–24	3 Æ	345, 347, 356	Cunliffe, 1978: 88	
SZ 170908	Hengistbury Head, 1981–2	2 Æ	346(1) Cast (1)	Index	Excavations
	Sussex				
SU 86.05	Chichester, 1974, Chapel Street	1 Æ	331	Down, 1978: 331	
			DUROTRIGES – UNCERTAIN		
	Hampshire				
SZ 170908	Hengistbury Head, 1912–14	1 Æ	Uncertain	Index	Bournemouth M.
		4 Æ	C or D	Index	Bournemouth M.
		2 Æ	C or D	M. Mays (pers. comm.)	Red House M.
			DOBUNNI – UNINSCRIBED		
	Buckinghamshire				
SU 85.93	High Wycombe, 1981	1 Æ	B	Index	
	Devon				
SK 48.53	Mount Batten	1 Æ	D	Gunstone, 1977 No. 203	
	Gloucestershire				
SP 017062	Bagendon, 1980–1	6 Æ	C–D (2), E–F(1), I–J(2), new type (1)	Index	Excavations
SP 01.06	Bagendon, 1981	1 Æ	C–D	Index	Excavations
SP 017067	Bagendon, 1981	1 Æ	B	Index	Excavations
SP 018064	Bagendon, 1981	1 Æ	F	Index	Excavations
SO 78.03	Frocester, 1982 or before	1 Æ	B	Index	Villa excavations
ST 78.98	Uley, 1977–8, West Hill	3 Æ	Uncertain	L. Sellwood (pers. comm.)	Roman temple excavations
	Hampshire				
SU 724029	Hayling Island, 1977–80, Temple	3 Æ/Æ	A	D. Nash (pers. comm.)	
	Hayling Island, 1977–8	2 Æ/Æ	B		
SZ170908	Hengistbury Head	2 Æ	F	M. Mays (pers. comm.)	Red House M.

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Oxfordshire				
SP 57.21	Alchester, 1981–2	1 Æ	E	Index	
	Shropshire				
SJ 565087	Wroxeter, 1977	1 Æ	C	Index	
	Somerset				
ST 655744	Bath, 1979–80, Temple Precinct	7 Æ	F(3), D–F(1), E–F(1), illegible (2)	Index	Excavations
ST 68.57	Camerton, 1982	2 Æ	B	Index	
	Warwickshire				
SP 095573	Alcester, 1976	1 Æ/Æ	D	D. Nash (pers. comm.)	Shown Ashmolean M.
SP 216556	Stratford-upon-Avon, 1982, Tiddington	1 Æ	B		Excavations
	Wiltshire				
ST 68.34	Bruton, 1982 or before	1 Æ	A	Index	
SU 161964	Castle Eaton, 1978, South bank of Thames	1 Æ/Æ	F	Robinson, 1978: 20	
ST 813733	Colerne, 1950 or after	1 Æ	B	Robinson, 1978: 20	Hoard 83
SU 10.93	Near Cricklade	1 Æ	F	Robinson, 1978: 20	
ST 891872	Easton Grey, 1982 or before	1 Æ	D–E	Index	
ST 89.87	Easton Grey (probably), 1982 or before	1 Æ	New type	Index	Affiliated to A
ST 98.53	Erlestoke, 1982 or before	1 Æ	A–B	Index	
SU 14.84	Kingshill, Swindon	1 Æ	F	D. Nash (pers. comm.)	Shown Ashmolean M.
ST 890871	Near Malmesbury, 1977, Easton Grey	1 Æ	D/E	D. Nash (pers. comm.)	Shown Ashmolean M.
SU 18.69	Marlborough, near, 1980–1	1 Æ	B–C	Index	
Correction Delete:	Rushall Down	Æ Dobunnic B (Haselgrove, 1978:94). Same coin as new type from Upavon, Wilts., (*Ibid.*, 98).			

DOBUNNI – IRREGULAR ISSUES (Robinson, 1978)

	Berkshire				
SU 38.66	Newbury, near, 1980 or before, Kintbury	1 Æ	New type	Index	
SU 823778	Waltham St Lawrence, Waycock Hill, Temple	3 Æ	L	J. P. C. Kent (pers. comm.)	Hoard 81
	Gloucestershire				
SU 192997	Lechlade	1 Æ	M	Index	Excavations
	Hampshire				
SU 724029	Hayling Island, 1977–80, Temple	2 Æ 3 Æ /Æ	New type New type	D. Nash (pers. comm.)	Excavations
	Wiltshire				
ST 890871	Near Malmesbury, 1977	1 Æ	L	Robinson, 1977: 14	
	Easton Grey	1 Æ	M		
SU 13.54	Upavon	1 Æ	M	Index	
SU 120772	Weir Farm	1 Æ	New type	Index	Rev. affiliated to M. Roman site

DOBUNNI – INSCRIBED

	Gloucestershire				
SP 183403	Chipping Campden, near, 1981	1 N	395 (BODVOC)	Index	
SP 02.01	Cirencester, near, 1981	2 N ¼	– (EISV)	Index	Believed associated. This coin is the quarter stater for N 388
	Cirencester, near, 1980 or before	1 Æ	396 (BODVOC)	Index	
ST 81.96	Kingscote, 1981 or before	1 Æ	389 (EISV)	Index	
SO 996095	North Cerney, 1982, 'The Ditches'	1 Æ	387 (ANTED)	Index	Excavations
	Hertfordshire				
SO 31.42	Dorstone, 1982	1 N	391 (CATTI)	Index	
	Lincolnshire				
TF 20.89	Ludford Magna, 1980	1 Æ /N	388 (EISV)	Index	
	Monmouthshire				
ST 47.90	Caerwent, 1982 or before, quarries	1 Æ	389 (EISV)	Index	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Oxfordshire				
SU 50.95	Culham, 1983, Warren Farm	1 Æ /N	388 (EISV)	Index	
	Shropshire				
SJ 39.05	Pontesbury, 1982 or before	1 N	393	Index	Or, Pontesford Hill, Shrewsbury?
	Somerset				
ST 655744	Bath, 1979–80, Temple Precint	2 R	387 (ANTED)	Index	
		2 R	389 (EISV)		
		1 Æ /R	?396 (BODVOC)		
ST 68.57	Camerton, 1981	1 Æ /N	385–6 (ANTED)	Index	
	Camerton, 1982	1 R	389 (EISV)	Index	
ST 65.60	Farmborough, 1982	62 N, in hoard	393 (CORIO)	J. P. C. Kent (pers. comm.)	
	Warwickshire				
SP 095573	Alcester, 1981	1 R	387 (ANTED)	Index	Or, Alchester, Oxon?
SP 31.96	Mancetter, 1980	1 R	387 (ANTED)	Index	Excavations
	Wiltshire				
SU 19.80	Chiseldon, *c.* 1971	1 N	392 (COMVX)	Robinson, 1978: 19, Haselgrove, 1978: 100–2	Reason to believe that the three staters reported from Chiseldon were found in south Oxfordshire
	Worcestershire				
SO 96.63	Hanbury, 1983	1 N ¼	394 (CORIO)	Index	
		CORITANI – UNINSCRIBED			
	Hertfordshire				
TL 39.24	Braughing district	1 R ½	445C	Mack, 1975	Prototype silver

	Lincolnshire				
SE 905138	Dragonby, 1966–73	1 Æ	F	J. May (pers. comm.)	Excavations
		1 Æ	J		
		1 Æ	U		
		1 Æ	W		
		1 Æ ½	Z_B		
	Dragonby, 1974	1 Æ	W	J. May (pers. comm.)	Surface find
	Dragonby, 1953	1 Æ	F	Index	
	Dragonby, 1974	1 Æ	V		
		1 Æ ½	V		
TA 093112	Kirmington, 1964	1 Æ	F	Index	
	Kirmington, 1970	1 Æ	U		
	Kirmington, 1966	2 Æ ½	X		
SE 88.17	Normanby	1 Æ	W	Index	
SE 945213	Old Winteringham, 1964	1 Æ ½	Z_A	Index	
SK 98.87	Owmby, 1971–4	4 Æ	F	Index	
	Owmby, 1971	1 Æ	I		
	Owmby, 1971–4	3 Æ	U		
	Owmby, 1969–74	4 Æ	V		
	Owmby, 1970, etc	8 Æ	X		
		1 Æ ½	X		
	Owmby, 1967	1 Æ ½	Z_A		
		7 Æ ½	Z_B		
	Owmby, 1970–3	2 Æ ½	Z_D		
TF 019328	Sapperton	1 Æ	X	Index	
		1 Æ ½	Z_A		
TF 08.25	Stainfield	1 Æ ½	Z_B	Index	
SE 98.20	S. Ferriby?, 1982 or before	1 Æ ½	456	Index	
	Norfolk				
TG 23.08	Norwich, near, 1982 or before	1 Æ	U	Index	Shown B.M.
	Northamptonshire				
SP 69.48	Towcester, 1982 or before	1 Æ	U	Index	
	Rutland				
SK 910171	Thistleton, 1967–71	1 Æ ½	Z_B	Index	
		1 Æ ½	Z_D		

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Yorkshire				
TA 40.19	Easington, coast find	1 Æ	F	Index	Found with Icenian inscribed coins
		CORITANI – INSCRIBED			
	AVN-AST				
	Lincolnshire				
SE 905138	Dragonby, 1967	1 Æ	458	Index	
SK 841775	Fenton, 1982 or before	1 Æ ½	cf. 457	Index	
SK 98.87	Owmby	1 Æ	458	Index	
	ESVP-ASV				
	Durham				
NZ 212168	Piecebridge, 1978, Tofts Field	1 Æ	456B	P. J. Casey (pers. comm.)	
	Lincolnshire				
SK 98.87	Owmby	2 Æ	456B	Index	
	Norfolk				
TL 77.88	Weeting-with-Broomhill, 1981 or before	1 Æ/Æ	456b	A. Gregory (pers. comm.)	
	VEP CORF				
	Essex				
TL 99.25	Colchester, near, 1982	1 Æ	460	Index	
	Hampshire				
SU 724029	Hayling Island, 1977 Temple	1 Æ/Æ	459	D. Nash (pers. comm.)	
	Lincolnshire				
SE 905138	Dragonby, 1974	1 Æ/Æ	459	Index	
TF 150403	Helpringham, North Fen	1 Æ	464	Index	
TA 093112	Kirmington	1 Æ ½	464A	Index	
TF 100240	Morton, 1982 or before	1 Æ	464	Index	
SK 98.87	Owmby, 1966–74	2 Æ	464	Index	
		4 Æ ½	464A	Index	
	Owmby, 1968	1 Æ ½	464A	Noted by D. F. Allen	
	Rutland				
SK 910171	Thistleton, 1974	1 Æ	464	Index	

	Yorkshire				
SE 06.41	Keighley, *c.* 1889	1 *N*	459–60	Evans, 1890: 511, as Verica; Allen and Haselgrove, 1979:14	More likely to be this
SE 98.26	N. Ferriby, 1980, on the beach	1 *N*	459	Index	
SE 68.31	Selby, 1977, Hemingborough	1 *N*	459	Christie's sale 4.10.1977, lot 70	
	VEP only				
	Lincolnshire				
TA 093112	Kirmington 1972–5	2 *R* ½	464B	Index	
SK 98.83	Owmby	2 *R* ½	464B	Index	
	DVMNO-TIGIR-SENO				
	Lincolnshire				
SK 98.83	Owmby	1 *R*	462	Index	
	VOLISIOS – DVMNOCOVEROS				
	Lincolnshire				
SE 92.22	Old Winteringham, 1982 or before	1 *R*	465	Index	
SK 98.83	Owmby, 1974	1 *N*	463	Index	
	UNCERTAIN – INSCRIBED				
	Lincolnshire				
TA 093112	Kirmington 1973	1 *R* ½		Index	
	Rutland				
SK 98.83	Thistleton, 1971	1 *R* 1 *R* ½	416	Index	
	INSCRIBED – ALL TYPES				
	Yorkshire				
SE 143250	Lightcliffe, 1829	19 *N* in hoard	457(1) 456B(1) 459–60(2) 463(8) 466(1) 461(2) Uncertain (4)	Allen, 1963	Supplements Allen, 1960, Hoard 35

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
		ICENI – UNINSCRIBED			
	Cambridgeshire				
TL 66.69	Chippenham, 1982 or before	1 Æ	IIIb	Index	See also *CUNOBELIN*
TL 39.86	Chatteris, 1982 or before	1 Æ	IIIb	Index	
TL 45.93	Wimblington, Stonea	3 Æ	IIIa	Allen, 1970: 21, 32	Hoard 77
		1 Æ ½, in hoard	VIa		
	Norfolk				
TF 905055	Ashill, 1979–80, Roman fort	2 Æ	IIIb–d	A. Gregory (pers. comm.)	
TF 909057	Ashill, 1979	1 Æ	IV(a–b)	A. Gregory (pers. comm.)	
TG 225235	Brampton, 1975, Roman town	1 Æ½	VI(d)	A. Gregory (pers. comm.)	Surface find
	Brampton, 1980	1 Æ	II	A. Gregory (pers. comm.)	
TL 940842	Brettenham, 1978	1 Æ ½	III(d)	A. Gregory (pers. comm.)	
TL 938840	Brettenham, 1977	1 Æ	III(a)	A. Gregory (pers. comm.)	
	Brettenham, 1979	1 Æ	II(d)		
	Brettenham, 1980	1 Æ ½	IV(d)		
TL 943847	Bridgham, 1978	1 Æ	IV	A. Gregory (pers. comm.)	Adjacent to Brettenham site
TG 37.09	Burlingham, 1982 or before	1 Æ	II(d)	A. Gregory (pers. comm.)	
		1 Æ	III(c)		
TF 66.24	Castle Rising, 1982 or before	1 Æ	IV	A. Gregory (pers. comm.)	
TM 33.91	Ditchingham, 1982–3, Wainford	3 Æ	IV	A. Gregory (pers. comm.)	From Iron Age and Roman site
		1 Æ	III(a)		
		1 Æ	III(b)		
		1 Æ	IV(c)		
		2 Æ	III(a) var.		
TL 699922	Feltwell, 1972	1 Æ	III	A. Gregory (pers. comm.)	100 yards north of Greenfield's villa site
TF 68.06	Fincham, 1982	1 Æ	III	A. Gregory (pers. comm.)	From Roman site

TG 101112	Honingham, 1953	1 Æ	IIIb	Allen, 1970: 21	Hoard 73
		10 Æ, in hoard	VIc		
TL 793943	Mundford, 1975–8	2 Æ	II(d), IV(a–b)	Allen, 1970: 21	
TG 175093	Norwich, 1979, Costessey	1 Æ ½	IV(d)	Allen, 1970: 21	
TF 72.13	Pentney, 1982 or before	1 Æ ½	IV(d)	Allen, 1970: 21	
	Riddlesworth, 1982 or before	1 Æ ¼	IV (d)	Allen, 1970: 21	
TF 887003	Saham Toney, 1976–9, Woodcock Hall	9 Æ	IId	R. A. Brown (pers. comm.)	
		8 Æ	IIe		
		1 Æ	New type		
		5 Æ	IIIb		
		1 Æ	New type		
		1 Æ	New type		
		1 Æ	IVa		
		3 Æ	IVc		
		2 Æ ½	VId		
		2 Æ ½	New type		
		1 Æ ½	New type		
TF 889006	Saham Toney/Threxton, 1976	1 Æ	II(a)	R. A. Brown (pers. comm.)	
		1 Æ ½	VI(c)		
TF 887003	Saham Toney, 1979, Woodcock Hall	3 Æ	IV	R. A. Brown (pers. comm.)	
		1 Æ ½	VI(c)		
TL 865847	Thetford, 1980–1 Gallows Hill	1 Æ	II(d)	R. A. Brown (pers. comm.)	Excavations of client kingdom enclosure site. With coin moulds. Coins not directly associated with debris
		1 Æ	III(a)		
		1 Æ	III(c)		
	Suffolk				
TL 68.86	Joist Fen, 1982 or before	1 Æ	IIa	Index	Hoard strays?
		1 Æ	IIe		
TL898339	Lakenheath 1959, Roman field	1 Æ	IIIb	Allen, 1970: 21	Hoard 78
		13 Æ, in hoard	VIc		

ICENI – INSCRIBED

	Cambridgeshire				
TL 39.86	Chatteris, 1982 or before	3 Æ	Vb	Index	
		1 Æ	VIII		

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
TL 44.93	March, 1981, Stonea	*c.* 860 Æ, in hoard	Includes: II, III, IV, V, VI, VII, VIII, IX and IIf. Apparently in the same proportions as at Eriswell (Suffolk). (Haselgrove, 1978: 114)	Seen B.M.	Currently under study. All coins belong to the East Anglian series. Found in C. 1st AD pot
	Norfolk				
TL 939840	Brettenham, 1979–80	1 Æ 1 Æ/Æ	V(b) V(b)	A. Gregory (pers. comm.)	
TG 37.09	Burlingham, 1982 or before	1 Æ 1 Æ	Vb VIa	A. Gregory (pers. comm.)	
TG 241040	Caistor-by-Norwich, 1977	1 Æ	IX(b)	A. Gregory (pers. comm.)	On marshes west of town
TM 33.91	Ditchingham, 1982–3, Wainford	1 Æ 1 Æ 1 Æ	Vb VI VIII	A. Gregory (pers. comm.)	
TL 737874	Hockwold-cum-Wilton, 1974	1 Æ	VI(a)	A. Gregory (pers. comm.)	Roman site
TL 742873	Hockwold-cum-Wilton, 1974	1 Æ	VIII	A. Gregory (pers. comm.)	Roman site
TG 101112	Honingham, 1953	11 Æ 10 Æ 14 Æ 1 Æ, in hoard	Vb VIb VIII IXa	Allen 1970: 21	Hoard 73
TF 74.13	Narborough, 1982 or before	1 Æ	VI(e)	A. Gregory (pers. comm.)	
TF 887003	Saham Toney, 1976–7, Woodcock Hall	12 Æ 1 Æ ½ 1 Æ ½	Vb New type New type	R. A. Brown (pers. comm.)	
	Saham Toney, 1977, Woodcock Hall	3 Æ 3 Æ	VIa VIII	R. A. Brown (pers. comm.)	
	Saham Toney, 1979, Woodcock Hall	1 Æ 1 Æ	V–VI IX(a)	R. A. Brown (pers. comm.)	

TL 865847	Thetford, 1980–1, Gallows Hill	1 Æ	VI	A. Gregory (pers. comm.)	Excavations of client kingdom enclosure site. With casting moulds. Coins not directly associated with debris
TG 105167	Weston Longville, 1852	3+ Æ, in hoard	Vb	Allen, 1970: 21	Hoard 71
	Suffolk				
TM 11.52	Baylham House, 1973, Combretovium	1 Æ	Vb	P. J. Casey (pers. comm.)	
TL 77.22	Icklingham	1 Æ	Vb	Gunstone, 1977, No. 225	
TL 68.86	Joinst Fen, 1982 or before	4 Æ	X	Mossop, 1979: 258–9	Hoard strays
		2 Æ	cf. Vb	A. Gregory (pers. comm.)	Hoard strays?
		1 Æ	VIa		
		1 Æ	IXb		
TL 898339	Lakenheath, 1959, Roman field	11 Æ	Vb	Allen, 1970: 21	Hoard 78
		31 Æ	VIb		
		2 Æ, in hoard	VIII		

ICENI – UNCERTAIN

	Cambridgeshire				
TL 443594	Cambridge, 1974–6, Castle Hill	1 Æ	Uncertain	J. Pullinger (pers. comm.)	
	Norfolk				
TF 72.13	Pentney, 1982 or before	2 Æ	Uncertain	A. Gregory (pers. comm.)	
TF 887003	Saham Toney, 1977, Woodcock Hall	1 Æ	Uncertain	R. A. Brown (pers. comm.)	
		1 Æ ½			
TM 15.79	Scole, 1983	many Æ in hoard	Uncertain	A. Gregory (pers. comm.)	Hoard of *c.* 200 Icenian Roman coins dispersed on building site. Latest coin apparently a denarius of Neva
	Suffolk				
TM 31.56	Hacheston, 1976	1 Æ	Uncertain	*Britannia*, 8 (1977): 405	
		1 Æ ½			
TL 90.34	Lakenheath, 1980	1 Æ	Uncertain	Shown Ipswich Museum	Hoard stray?

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
Corrections					
Delete:	Wimblington, Cambridgeshire 5 AR Uncertain (Allen, 1960: 267) and see above				
Delete:	Honingham, Norfolk 45 AR Uncertain (Allen, 1960: 267) and see above				
Delete:	Thorpe-next-Norwich, Norfolk Sev.(?) AR Iceni (Allen, 1960: 263)				
Delete:	Lakenheath, Suffolk 47 AR Uncertain (Allen, 1960: 267) and see above				
			ARMORICAN		
	Devon				
SX 92.92	Exeter, 1891, Northernhay	1 AR	Coriosolites Class VI	N. Beagrie (pers. comm.), *Devon Assoc*, **5**: 317–8	Coin had been mounted
	Dorset				
SY 57.84	Abbotsbury beach, 1824	1 AV	Veneti DLT6826–7, 30, 35	Gunstone, 1977, No. 229	
SY 69.90	Dorchester S railway station	1 AE	NW Gaul	Gunstone, 1977, No. 232	
ST 988162	Sixpenny Handley, 1982, Manor Farm	1 AR	Coriosolites, Classes I–II	M. Corney (pers. comm.)	
	Hampshire				
SU 20.09	Ellingham, 1980, Castle Piece, Roe Wood	43 AV, in hoard	'Baiocasses' cf. DLT 6983–5 (28), cf. DLT 6955, 6967, 6969, 6978, 6982 (15)	Seen B.M.	See *Gallo-Belgic D* and *British A 1*
SU 724029	Hayling Island, 1977–8, Temple	2 AR	Coriosolites, Classes I–VI; DLT J29	D. Nash (pers. comm.)	
	Hayling Island, 1978–80, Temple	2 AR	Coriosolites, Classes I–VI	D. Nash (pers. comm.)	One halved. Excavations
		1 AR	cf. Allen, 1960: Pl. XIII, 20		

SZ 170908	Hengistbury Head, 1918–24	2 Æ	Coriosolites, Classes I–VI	Cunliffe, 1978: 89	

MISCELLANEOUS GAULISH – GOLD

	Berkshire				
SU 823778	Waltham St Lawrence, 1977, Waycock Hill	1 N ½ 1 N ¼, in hoard	Scheers, Nos. 1–5	J. P. C. Kent (pers. comm.)	Allen X_A
	Hampshire				
SU 724029	Hayling Island, 1977, Temple	1 Æ/N	Scheers, No. 27	D. Nash (pers. comm.)	Allen X_F CRICIRV
	Hertfordshire				
TL 15.07	St Albans, 1914 or before	1 N ¼	Scheers, No. 23	*Spinks Num. Circular*, Jan. 1914, No. 14287	
	Kent				
	Uncertain, in the county	1 N	Scheers, No. 29/2	*Stanley Gibbons Currency List*, 1977, No. 15	Allen X_E

MISCELLANEOUS GAULISH – SILVER

	Hampshire				
SU 724029	Hayling Island, 1977–8, Temple	3 Æ/R	Scheers, No. 41	D. Nash (pers. comm.)	ATEVLA VLATOS
		1 R	DLT 5550		TOGIRIX
	Hayling Island, 1980, Temple	1 R	DLT 9025, (SOLIMA/ CO IMA)	D. Nash (pers. comm.)	Excavations
		1 R	DLT 5405, (Q DOCI SAM F)		
SU 48.29	Near Winchester, *c.* 18th or before	1 R	Scheers, No. 51/1	Allen forthcoming	
	Kent				
TR 15.58	Canterbury, 1980, Marlowe	1 R?	cf. Scheers No. 94	D. Nash (pers. comm.)	Excavations

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
			MISCELLANEOUS GAULISH – BRONZE		
	Essex				
TL 470127	Harlow, Holbrooks	1 Æ	cf. Scheers, No. 80f, j	Haselgrove, 1978: 36, as L_X new type	
TL 987253	Colchester, 1970, Sheepen	1 Æ	cf. Scheers, No. 89	Index	Excavations
TL 99.25	Colchester, 1976, St Helen's School site	1 Æ	Scheers, No. 93	Index	Excavations
	Hampshire				
SU 724029	Hayling Island, 1979, Temple	1 Æ	DLT 6295 (TAS-GETIOS)	D. Nash (pers. comm.)	Excavations
	Hayling Island, 1977–8, Temple	1 Æ	Scheers, No. 83	D. Nash (pers. comm.)	
		1 Æ	Belgic-Gaul		
	Hertfordshire				
TL 386238	Skeleton Green, Puckeridge, 1971	1 Æ	Scheers, No. 80d–e	Index	Omitted from Haselgrove, 1978: 129
	Kent				
TR 15.58	Canterbury, 1980	1 Æ	Scheers, No. 119	D. Nash (pers. comm.)	
TR 324602	Richborough	1 Æ	DLT 1673?	Allen, 1965:187	Report II, 2493.
TQ 99.47	Westwell, 1977	1 Æ	BN6188 'Carnutes'	D. Nash (pers. comm.)	Shown Ashmolean M.
	Hampshire				
SU 72409	Hayling Island, 1977, Temple	1 Potin	Scheers, No. 194	D. Nash (pers. comm.)	
		1 Potin	Scheers, No. 206/1		
		1 Potin	Touraine type		No flower
	Hayling Island, 1977–8	2 Potin	Central Gaul		
	Hayling Island, 1978	1 Potin	Belgic Gaul		
	Hayling Island, 1980, Temple	1 Potin	Belgic Gaul	D. Nash (pers. comm.)	Excavations

	Kent				
TR 15.58	Canterbury, 1979, St Margaret's Street	1 Potin	Early tête diabolique	D. Nash (pers. comm.)	Excavations
	Canterbury, 1980, Marlowe	1 Potin	Scheers, No. 198	A. Gregory (pers. comm.)	
		1 Potin	Scheers, No. 199 or 205	A. Gregory (pers. comm.)	
		1 Potin	cf. Scheers, Rouen 301	A. Gregory (pers. comm.)	
	Norfolk				
TL 943847	Bridgham	1 Potin	Early tête diabolique	A. Gregory (pers. comm.)	
TL 687376	Heacham	1 Potin	Early tête diabolique	A. Gregory (pers. comm.)	
TL 62.94	Southery, 1982 or before	1 Potin	Tête diabolique	A. Gregory (pers. comm.)	
			UNCERTAIN		
	Cambridgeshire				
TL 443594	Cambridge, before 1976, Castle Hill	1 Æ	Uncertain	Noted by author	Possibly Gaulish? Obv. CVNI. female head?
	Essex				
TL 987253	Colchester, 1930–9, Sheepen	68 Æ	Uncertain	Hawkes and Hull, 1947: 141	Omitted from Allen, 1960. All illegible
	Hampshire				
SU 724029	Hayling Island, 1977–8, Temple	2 Æ/*N*	Uncertain	D. Nash (pers. comm.)	
		2 Æ	Uncertain		One probably British
	Hayling Island, 1979–80 Temple	1 Æ	Uncertain	D. Nash (pers.	Belgic Gaul? Two animals facing/ horse right?
TL 470127	Harlow, 1970, Holbrooks	1 Æ	Uncertain	Noted by author	
SZ 170908	Hengistbury Head, 1980–1	1 Æ	Uncertain	Noted by author	Rev. horse.
		1 Æ frag.			Not certainly a coin
	Hertfordshire				
TL 39.24	Braughing district	1 Æ	Uncertain	*Seaby CAMB*, Oct. 1976: 279–81, No. 4	

Grid ref.	Provenance	Denom.	Class	Source of information	Notes
	Kent				
TR 15.58	Canterbury, 1979, by-pass	1 Æ	Uncertain	D. Nash (pers. comm.)	cf. *DUBNOVELLAUNUS* and Scheers, No. 164. Obv. head. Rev. galloping wolf. Excavations.
	Canterbury, 1980, Marlowe	1 Æ	Uncertain	D. Nash (pers. comm.)	Obv. Horseman cf. *DUBNOVELLAUNUS*. Excavations
	Canterbury, 1981, Dane John	1 Æ	Uncertain	D. Nash (pers. comm.)	Not Belgic Gaul? Cf. Carnutes. Excavations
	Canterbury	1 Æ	Uncertain	Canterbury excavations, Coin No. 2235	Probably Belgic Gaul
	Lincolnshire				
SK 98.83	Owmby, Cliff, before 1975	1 Æ	M445b	Mack, 1975	cf. Puckeridge coin, Haselgrove, 1978: 118
	Norfolk				
TL 887003	Saham Toney, 1976–8, Woodcock Hall	1 ℞ 2 Æ	Uncertain	R. A. Brown (pers. comm.)	
	Wiltshire				
SU 215695	Mildenhall, 1978, Black Field	1 ℞	Uncertain	Index	Obv. standing figure with staff
Correction Delete:	Puckeridge Æ new type in Essex/Herts. group (Haselgrove, 1978: 118) and see *CORITANI – UNINSCRIBED* ℞ M445c				
	INADEQUATELY RECORDED COINS				
	Essex				
TL 987253	Colchester, 1835, Union House	22 ℕ 15 ℞ 8 Æ, in hoard	Uncertain Chieftains	Allen, 1960. 292	See also *CUNOBELINUS* Hoard 28

The Cycladic Beaked Jug Supposedly Found in Minorca

by CELIA TOPP and L. PLANTALAMOR

Thirty-five years ago this Cycladic beaked jug was the subject of a study by a Spanish archaeologist (Martinez Santa Olalla, 1948: 37–42). It has recently again been described and discussed by two other Spanish archaeologists, this time in a Minorcan context (Belén and Fernandez Miranda, 1979: 149–53, and Plate XII). The first writer considered the jug as a *positive* proof of relations between the Aegean and the western Mediterranean during the early second millennium BC. The two latter writers only regard it as a *possible* proof of such connections. All three based their belief on the assumption that a similar Cycladic jug lodged in the Château Borély museum of Marseilles (accession number 1930/3430) was correctly provenanced as coming from the Bassin du Carénage of that city. The fact that this provenance has been positively discredited (Benoit, 1956: 17 Plate II, Fig. 4) places the onus of proof entirely on the evidence of the Minorcan jug lodged in the museum of Minorca (accession number 357 of the Vives collection). Thus it appears worthwhile to recapitulate this prehistoric object's long and controversial recent history and to attempt to assess its value as a witness to possible early contacts between the Cyclades and the Balearics. This paper also aims at providing an up to date and as complete as possible bibliography of the jug – but in no manner pretends to discuss Cycladic jugs in general.

Description (Figs. 1 and 2 and Plate I)

This beaked Early Cycladic jug is one of the common forms from the First City at Phylakopi described and illustrated by Atkinson *et al.* as Geometric Beaked jugs (Atkinson *et al.*, 1904: 94, and Plate IX, nos. 5, 6 and 7). It belongs to Barber's type 8 (Barber, 1974: Plate 2, b) and (Barber and Macgillivray, 1980: Figs. 2, no. 25).

Its dimensions are: height, 0.173 m; base diameter, 0.052 m; maximum body diameter, 0.101 m. It is made of finely gritted beige-coloured clay, well fired in a closed kiln. Most previous writers give it as hand-made but it appears more probably turned on a slow wheel. Edgar, (Atkinson *et al.*, 1904: 94) described the pottery of this period as 'Shaped with great regularity . . . and judging from the outward appearance alone one would put it down as wheel made'. But he admits that he has never observed *certain*

Plate I The Cycladic jug now in the Mahon Museum, Minorca (scale 1 : 2)

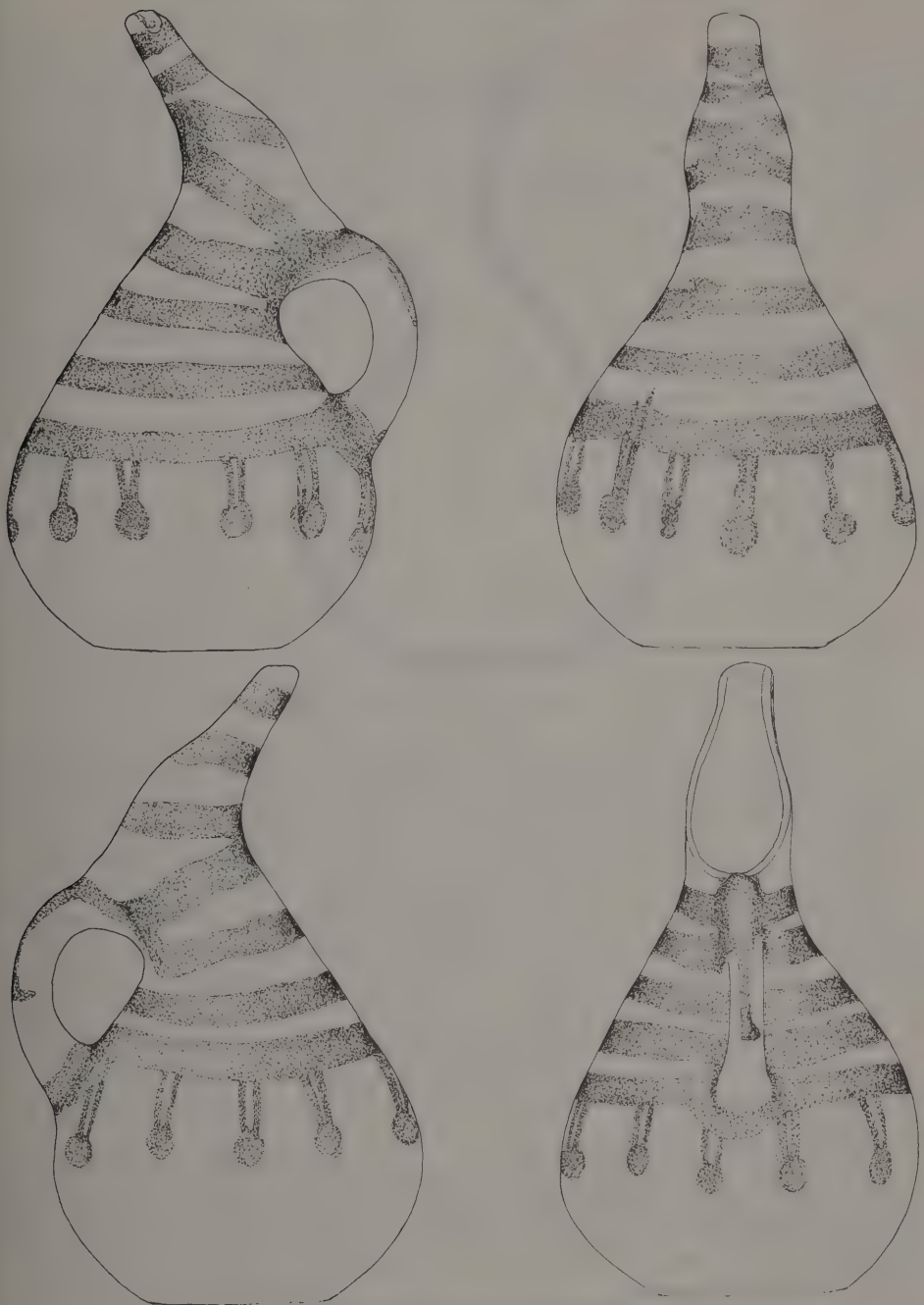

Fig. 1 Drawings of the Cycladic jug now in the Mahon Museum (scale 1 : 2).

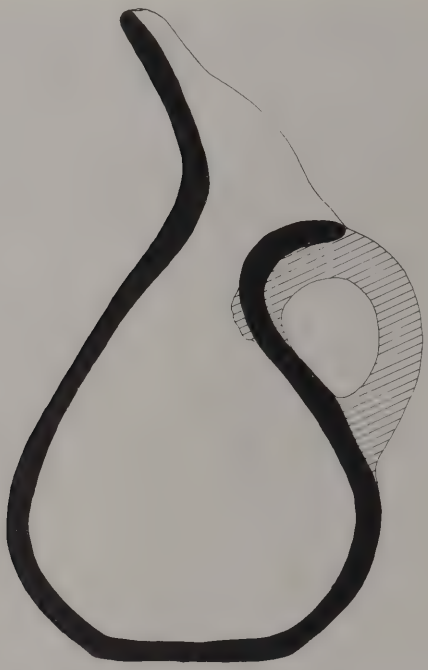

Fig. 2 Section of the Cycladic jug showing the 'thrust' handle (scale 1 : 2).

traces of a wheel. Blinkenberg, however (Atkinson *et al.*, 1904: 94), speaks of the Sèvres vases from Phylakopi of the same period as wheel-made. Modern opinions concerning the matter differ: Barber considers even a slow wheel manufacture unlikely at such an early period whereas Renfrew thinks it very possible (both personal communications).

The jug has a plano-convex well-differentiated base and a very solid handle which runs from the back of the spout to the initial swelling of the body. This handle was made as a separate entity and intrudes into the body (Fig. 2). Some previous writers have described the handle as 'made fast with barbotine' (Santa Olalla, 1948) or as 'held in place by means of an adhesive solution' (Belén and Fernandez, 1979). In actual fact – as noted by Atkinson *et al.* (1904: 94) – 'The handles of these jugs are attached in a characteristic manner: the lower end, and the upper also when it is not fastened to the rim, as it usually is' – as also in this particular case – 'is stuck through a hole in the side of the vase and protrudes on the inside'.

Many previous authors speak of a coat of lustrous white paint but nowadays this is best described as a poorly preserved pale ochre slip. This is smooth on the lower portion of the body in contrast to the rest of the surface – as noted at Phylakopi where the slip is described as 'thicker and firmer on the upper part where the design is' (Atkinson *et al.*, 1904: 94).

The jug was decorated before firing with a pattern of eight horizontal bands exe-

cuted in dark brown matt paint running round the spout, neck and upper portions of the body (Fig. 1 and Plate I). The lowest band has a series of thinner double vertical lines ending in filled-in tear-drops: a Cycladic jug of different shape but with a very similar pattern is illustrated by Dawkins and Droop (1911: Plate VI, no. 4). 'There are remaining traces of a line of paint running down the handle and, as is also typical of these jugs, a line of paint round its root. In general the decoration gives the impression of somewhat hasty or casual work in contrast to the care exercised in the fabrication and firing.

The jug is in almost perfect condition. It has a very slight chip on the left of the spout opposite the handle and another half way up on the same side. This perfection militates against credence of the supposed find-spot of the jug (the Cova des Coloms, where most of the material was in poor condition). It would appear far more at home in a funerary context in its native island of Melos than in Minorca.

The jug – usually called a *Schnabelkanne* in Spanish literature and even *oinochoe* by Almagro and Pericot – was first described by Hernandez Sanz (1908: 94). He merely says that 'it is a vase which belonged to the Ramis collection and hence is of Minorcan provenance'. He considers it very similar to 'Cypriot pots' but even more akin to those Schliemann found at Troy. His illustration differs very little – if at all – from that given two years later by Vives Escudero who bought the Ramis collection and published many of its items. Concerning the jug Vives says, after describing some local artefacts: 'to these indigenous ceramics whose manufacture shows great antiquity one must add some cases of undoubted importation' (Vives Escudero, 1910: 397–8 and Fig. 1). After a careful description of the jug he refers to Dussaud (1907: 127, Fig. 47) and to Perrot (Perrot et Chipiez, 1894: Figs. 448 and 457) for illustrations of similar objects. It is extremely significant that Vives merely gives the jug as forming part of the Ramis collection and as 'found in Minorca' whereas he cites the exact provenance of the three objects he next describes. The jug is Fig. no. 1 in Vives' descriptions and it seems noteworthy that both his numbers 2 and 3 'also from a cave in Minorca' are only fragments of pots.

At this juncture it appears appropriate to give a short sketch of the original Minorcan owners of the jug. There were five Ramis brothers living in Mahon during the earlier part of last century. The two best known are Juan, the eldest, and Antonio the youngest who, incidentally, was also Juan's son-in-law. Both were lawyers, historians and antiquarians, owners of important collections, who had studied and travelled in France. According to a later writer (Flaquer y Fabregas, 1944: 151–4) neither of the brothers was given to over-careful personal investigation although Juan strikes one as the more conscientious. An extreme illustration of the casual nature of Antonio's activities is the fact that when engaged in transcribing a medieval inscription in Ciudadela cathedral he relied on the work of careless copyists rather than travel himself across the island. Both brothers were notable numismatists with wide foreign connections, given to exchanging and buying coins and antiquities from many parts. The provenance of objects in their collections was often only casually recorded. A number of items came from their country property of Addaya in the north of the island and this gave rise to the assumption by

later writers that the jug was found there. There exist many references to caves in Addaya and the numerous pots, metal objects and Carthaginian glass beads therefrom (none of which bear any relation to the Cycladic jug). Another fact worth noting is that Vives bought the Ramis collections from their heirs. Since he was born in 1859 he could not have known either of the brothers, both dead by 1840 and thus he could not have learned directly from them the exact find-spot of any of the objects.

The jug is next mentioned by Juan Hernandez Mora (1924: 66). His not very helpful contribution runs as follows 'of the few objects about which there exists not the slightest doubt that they are imports into the island is the Cypriot vase which belonged to the Ramis – nowadays the Vives – collection'. He then quotes Hernandez Sanz and Vives and incorrectly identifies the jug with far later ones from Troy VII, Sardinia and Marseilles, an error pointed out some years later by Bosch Gimpera (1937: 31, note 1).

All through the 1930s the latter and another reputable Spanish archaeologist, Martinez Santa Olalla, both fervent adherents to the twin doctrines of diffusionism and *ex oriente lux,* firmly believed in the jug as a witness to early cross-Mediterranean relations.

Bosch Gimpera first refers to the jug in 1926 (1926: 95–111) and then again frequently: (1932: 230; 1937: 21–35; 1945: 85; 106, 118). He reiterates its antiquity as an import in all these articles and books and stresses the fact that taken in conjunction with the Marseilles jug it proves the existence of early commercial relations between the eastern and western Mediterranean.

His pupil and disciple Marinez Santa Olalla follows in his footsteps and twice mentions the jug, emphasising its importance as proof of such maritime relations (Martinez Santa Olalla, 1935: 61, 64; 1937: 25–8). He affirms textually that 'the *Schnabelkanne,* a Cycladic import found in Minorca, provides a firm date (for such connections) which can in no way be later than 1700 BC'.

Then came the Spanish civil war and the jug 'disappeared', though even *in absentia* it constituted a bone of contention among Spanish scholars. In 1940, with the war recently ended, with Bosch Gimpera in exile and Martin Almagro Basch the bright new star on the archaeological horizon, the latter launched an attack on the jug's reliability as proof of early connections between East and West (Almagro Basch, 1940: 117, 118). He considered the Minorcan and Massiliot jugs jointly and, somewhat unfairly, accepted the latter, which he was inclined to think provided proof of early trade relations. Somewhat surprisingly he described it as painted in post-Mycenaean style, thus making it younger by several centuries than it is in reality.

His broadside was reserved for 'the jug from Minorca . . . so often quoted by Bosch . . . who has made use of it so many times.' Almagro recapitulated the jug's past history and quoted Colominas in order to illustrate the traffic in antiquities practised by the Ramis brothers. He pointed out the total lack of details concerning the jug's exact provenance, the fact that there exists no material whatsoever of such an early period in the island and he rightly discredited Hernandez Sanz's naive acceptance of the jug's

Minorcan location on such a slight basis as its inclusion in the Ramis collection. It is interesting to note that Almagro stated that 'this supposed Balearic pot is nowadays lost' and it would seem, judging by his drawings and their captions, that he may only have seen both jugs as illustrations and not in reality.

In 1944 Flaquer y Fabregas took up the cudgels on behalf of the jug's second millennium BC Minorcan provenance. His article (Flaquer y Fabregas, 1944: 151–4) provided an excellent biography on both the jug and its previous owners but utterly fails to convince, since his acceptance of its provenance is mainly based on the fact that 'such an illustrious prehistorian as Julio Martinez Santa Olalla, so well versed in Balearic archaeology, accepts its island provenance as certain', Flaquer bolstered his argument by citing the similar opinion of all the above mentioned – naturally excepting Almagro's! and by proposing as possible parallels some handles found by Margaret Murray 'which came from a spot not far distant from Addaya', i.e. from Sa Torreta. Unfortunately these handles hardly serve to strengthen his case since they belong to a far more recent period than the jug (Murray, 1934: 20, and Plate XXXI, nos. 78 and 79).

In 1945, as already mentioned, the jug's importance was stressed by Bosch Gimpera and in 1948 Garcia y Bellido illustrated it, mentioned its disappearance and speculated on its possible whereabouts (Garcia y Bellido, 1948: 8, Fig. 3). In that same year Martinez Santa Olalla entered the lists and argued strongly in favour of the Minorcan provenance of the much-disputed object (Martinez Santa Olalla, 1948). He was of course vindicating Bosch Gimpera and set out to contradict Almagro's verdict as viciously as the latter attacked Bosch Gimpera's in 1940. He first referred to Almagro's ignorance of both Minorcan archaeology and living conditions in the Balearics during the last two centuries, then quotes Flaquer's paper which according to him clearly established that the jug was found in Minorca 'most likely in Addaya, well known for its rich archaeological resources'. He further asserts that when a student in Madrid he saw the jug in the Vives collection and took the photograph which he 'now publishes for the first time'. He adds that despite all his efforts with Vives' heirs he has been unable to locate the jug which he strongly suspects is by now lodged in some private American collection. He is one of the authors who describes the jug as 'carefully hand-made' whereas the present writers (who have handled it freely and frequently) consider it more probably as turned on a slow wheel. He then comments on the jug's close resemblances to 'almost identical ones from Phylakopi', places it in 'the First Geometric style of Melos in Cycladic I' and dates it between 2000 and 1700 BC. He next considers the Marseilles jug (then still believed to have been found in the Bassin du Carénage). He refers to 'an ex-pupil of his (Almagro) 'who doubtless due to a lapse' described the jug as 'of Cycladic post-Mycenaean type' and quotes Furumark (1941) to support the utter implausibility of such a description. Martinez Santa Olalla concludes by reiterating and stressing the importance of both jugs, 'despite our ignorance of the exact find-spot of the Minorcan one' which latter he considers 'an ancient and pure Aegean document proving maritime relations and Eastern Mediterranean influence on the Iberian Peninsula and the islands during the Early Bronze Age'.

After this somewhat saddening article little more is heard of the jug, considered as lost and no longer of polemic interest among Spanish archaeologists.

Twenty-odd years later Pericot (1972: 96 and Plate IV) states 'the oldest Greek find known in the Balearics is an *oenochoe* in the Ramis–Vives collection which was apparently discovered in Minorca at the start of the nineteenth century. This is a beaked jug (*Schnabelkanne*), 17 cm high, of whitish colour with dark bands. I do not think there exists much support for the doubts expressed concerning its Minorcan provenance. Its interest lies in its Cycladic nature, its date (early second millennium BC) and its resemblance to a similar find from the Basin de Carénage at Marseilles'. Since the find-spot of the latter jug had already been discredited more than 15 years earlier (Benoit, 1956, *op. cit.*) this statement by an eminent and internationally respected Spanish scholar is also saddening in retrospect.

Pericot does not mention the jug's whereabouts – though he may well have seen it in the Mahon museum in the course of his frequent visits to Minorca. But in 1975 we read of 'the beaked jug on display in the Museo de Bellas Artes of Mahon' and once again learn the legend of its discovery in Minorca during the early nineteenth century (Foss, 1975: 110).

What had happened to the jug between 1940 when Almagro reports it as lost (statement echoed by Martinez Santa Olalla in 1948) and 1975? The answer lies in the record book of the Mahon museum (*Los Actos del Museo Provincial de Bellas Artes de Mahon*).

Under the heading of 20 April 1945 we read of a request made 'for objects connected with Minorca belonging to the Vives collection' to be forwarded to the recently inaugurated museum there. This request is addressed to Madrid and Barcelona because objects from the Vives collection were housed in the museums of both cities.

On 22 December of the same year we learn that an unspecified member of the Vives family promises to forward material formerly belonging to Vives Escudero.

Finally, on 2 March 1946, is entered: 'Received an important lot of books and archeological objects belonging to the collections of the Minorcan archaeologist Vives Escudero. It is agreed to record officially this institution's gratitude to the family of the illustrious Minorcan for their praiseworthy gesture of donating on loan the above-mentioned objects. The señores Flaquer, Victory and Sancho wish to express these thanks very particularly and personally to the said family.'

And there, safely loaded in the museum of Mahon, the jug has remained for almost 40 years. It is not currently on display since the new museum is still only in the embryonic stage but it is available on request to all *bona fide* scholars and students.

Naturally the jug was known to non-Spanish archaeologists and mentioned by many. In the first edition of the *Dawn*, Gordon Childe refers to it as 'an imported jug of Cycladic matt-painted ware' which represents 'the Aegean inspiration in the Balearics' (1925: 108). In a later edition he mentions it as 'evidence of early contact between the islands and the Aegean . . . certainly an import though found without definite context on Iviza' (Childe, 1947: 256). Ten years later he repeats the above textually but this time correctly gives the island as Minorca (Childe, 1957, 236).

Bossert describes the jug and dates its discovery to between 1810 and 1840 (1954: 34 and Plate XVI, 2). She notes that its find-spot is not authenticated and that the Marseilles jug constitutes an isolated item amidst far more recent material. She remarks that although Aegean imports reached the West during the Cycladic period, one must bear in mind – especially in the case of the Minorcan jug – Dümmler's warning concerning the sacking of a necropolis of rock-cut tombs at Phylakopi. This occurred during the Greek War of Independence (1821–9) and the bulk of the material thus obtained was taken to France. This fits with facts known about the Louvre jug (Pottier, 1897: 35 and Plate XXIX, D5) which was bought during the reign of Louis Philippe in the 1830s. as also with Hogarth's remarks on the same subject: 'Untouched graves were certainly found near Phylakopi about 1830 and from them come certain early Melian vases in various European museums' (Atkinson *et al.*, 1904: 24). Gordon Childe, reviewing Bossert's paper, reiterates 'the warning of Bosanquet and Dümmler that the Marseilles jug may quite possibly have been brought to France in the early nineteenth century at the time of the Greek war of liberation' (1955: 183).

And then, the following year, Benoit conclusively discredited the Marseilles jug as a witness to early East–West maritime connections (Benoit 1956). He proved beyond any doubt that it was fraudulently introduced into the collections of the Museé Borély and that though its real find-spot remains a mystery, it could never have been the Bassin du Carénage. He reiterated this 10 years later (Benoit, 1965: 18) and remarked on the likeness of the Massiliot jug to those of Minorca and the Louvre. He concludes that it appears reasonable to suppose that all three came from the Phylakopi cemetery and were subsequently brought to France.

A year later Zervos cited Benoit as positively discrediting not only the jug in the Borély but also the one in Mahon (Zervos, 1957: 16). He illustrated one from Phylakopi in the Athens museum which bears a striking resemblance to both the others, rejected the arguments of Flaquer and M. Santa Olalla and approved those of Almagro. But he admits that it is extremely hard to determine the extent of Early Cycladic connections with the West which certainly reached the Adriatic and Sardinia. However, he refuses to consider either of the two Melian jugs in question as credible proofs of traffic further afield.

During the last decade opinions concerning the Minorcan jug have varied considerably. Renfrew (1972: 444) thinks that both jugs were 'probably transported in recent times'. Later (Renfrew, 1977: 26), he urges 'caution concerning possible links between the Aegean and the Western Mediterranean in the EBA'. Nevertheless, in the same paper, he agrees that this remains open to discussion although he himself 'is satisfied that there exists no evidence whatsoever for direct contact between the Cyclades (or any other Aegean region) and Iberia at that time'. And he concludes by stating that he believes early Cycladic influence on the West to be 'a diffusionist fiction'.

On the other hand Höckmann, in a paper in the same book (Höckmann, 1977: 167), affirms his belief in 'the only two original Early Cycladic objects found in the Western Mediterranean: the two Melian jugs, one found in Minorca and the other allegedly from Marseilles'.

In a contemporary context Cintas briefly refers to the Marseilles jug as 'l'homologue d'un vase trouvé à Minorque. Mais on a su récemment que ces vases provenaient d'achats fait au Proche Orient' (1976: 35, Plate XXXVII and Fig. 4). Thus he is dubious about both jugs and discredits their witness value but does not give his reasons for so doing.

More recently Renfrew once again categorically dismisses the jugs and considers them both as 'convincingly discredited' (Renfrew, 1979: 52). He bases this conviction on the opinions of Benoit and Almagro but adduces no new proofs as further evidence. He is very probably correct in considering both as 'products of the early plundering of the Phylakopi tombs in the nineteenth century AD' but whereas we consider Benoit's argument conclusive, Almagro's assertion does not strike us as convincing.

These lingering doubts are evident in the contemporary work of Belén and Fernandez Miranda already mentioned (1979). The authors are fairly hesitant but conclude that the Minorcan jug (though certainly not coming from Addaya since most of the finds from there belong to the Roman period) cannot be altogether dismissed. They consider it a plausible hypothesis to admit 'the remote possibility of its balearic find-spot' and since they believe in East–West Mediterranean contacts during the last centuries of the third millennium this strikes them as reasonable – although they note the lack of any similar material of that period in the Balearics. Their belief is based on the fact that they consider the Marseilles jug as 'well documented' despite its not having been found during the course of 'an organised excavation'. They quote Dumont, and Froehner's famous catalogue – published respectively in 1881 and 1897 – but make no mention of Benoit's far more recent work which has completely discredited the French jug.

Reviewing the evidence, it seems very tempting to assess both objects as untrustworthy witnesses to early cross-Mediterranean contacts. However, our recent discovery in the Mahon archives of two publications by the Ramis brothers provides some new evidence. The first work, written by Juan (Ramis y Ramis, J., 1818) describes many Minorcan monuments and some objects therefrom. Although he describes and illustrates two bronze artefacts there is no mention of the jug and this omission strikes us as a most telling one.

The second, written some 15 years later by Antonio (Ramis y Ramis, A., 1833: 45) concerns objects from the brothers' collections and among them figures the jug. He asserts that all the objects described – with the exception of numbers 1 and 2 which are a lot of five ushab'ti figures and a mummified hand – *were found in Menorca'*. The year of publication is significant: it post-dates Juan's death in 1819, the Greek war, the looting of the Phylakopi tombs and concurs with the date proposed for the intrusion of the massaliot jug into the Musée Borély. Antonio Ramis was a member of various French learned societies and could well have visited France around that time when the Phylakopi objects were on sale there: it seems very plausible that he might have then acquired the jug. Nevertheless the fact remains that although he gives the Egyptian objects as recent importations to Minorca – perhaps because even antiquaries of that period might hesitate to accept an insular provenance for them – he claims an indigen-

ous provenance for all the other objects he describes. Among these figure 'fourteen clay jugs *of which two are spouted*, and very like the one described by P. M. Florez on p. 40, Fig. 4 of Vol. I' (Florez, 1757); this jug, however is a Roman bronze ewer. What happened to the second jug is not known; in a photograph of objects of the Ramis collection taken by Diego Monjo at the turn of the century there figures only one beaked jug.

So it seems that the only possible verdict concerning the Minorcan jug is that of 'not proven'. The fact that the provenance of one jug has been proved to be spurious cannot *ipso facto* discredit the other. The weight of the evidence adduced inclines us to believe that the Balearic jug is far more likely to have reached Minorca towards the close of the second millennium AD. Yet it still persists, a solitary swallow which could be used – albeit not very credibly – to suggest contact between the Eastern and Western Mediterranean islands during the Early Cycladic period.

Acknowledgements

We are greatly indebted to the following who have provided encouragement and helped to trace references to the jug: Dr R. Barber, Professor J. Boardman, D. Jorge Fernandez and D. Carlos Gomez of Ibiza Museum, Professor C. J. Hamson, QC, of Trinity College, Mr Sinclair Hood, Esperanza Manera and Carolina Tur of the University of Barcelona, Maiti Orfila of the University of Palma de Mallorca, Helena Pastor of the University of Fribourg, Professor C. Renfrew, Cristina Rita of the Museum of Mahon, Mrs H. M. Shire of Robinson College and the librarians of the Haddon Classical and University libraries at Cambridge.

As always, very special thanks are due to Professor J. D. Evans, Director of Archaeology of the University of London, not only for similar assistance but also for most kindly editing this paper and correcting the proofs.

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Abstract

This beaked Melian jug lodged in the museum of Mahón now remains as the only proof of possible East–West Mediterranean contact during the Early Cycladic period, the false provenance of its counterpart in the museé Borély having been exposed. Yet the Minorcan jug could still be – and indeed is – used as an argument for such early relations. This paper aims at providing the recent history of this controversial object as well as an up to date bibliography. Though it appears most likely that the once-lost Minorcan jug was introduced into the island early last century, recent discoveries in Minorcan archives leave a lingering doubt that cannot altogether be dispelled.

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The Metalworkers' Tools from Tell Edh Dhiba'i

by CHRISTOPHER DAVEY

The magnificent metalwork of Sumer and Babylon is evidence of the well-developed and highly sophisticated craft of the ancient metalsmith (Maryon and Plenderleith, 1956: 624). The details of his techniques however remain largely a mystery to us because it is not possible to deduce with complete certainty the precise method used to manufacture an artefact by careful analysis of the artefact itself. An object's shape may give an indication of the processes involved in its fabrication and metallographic analysis can reveal the final phases of that production, (Hodges, 1966: 209–19), but even with the most thorough study the ancient craftsman will remain a shadowy figure until the actual tools of his profession are considered. Such tools were found during an excavation conducted by the Directorate of Antiquities of Iraq in 1965 at the site of Tell edh Dhiba'i in the suburbs of modern Baghdad (al-Gailani, 1965).

The artefacts discovered in the area of the coppersmiths' workshop at Tell edh Dhiba'i were all made from clay suggesting that before destruction objects of value were removed. (Metal objects in the form of rough castings for example were found in the workshop excavated at Kültepe (Özgüç, 1955: 79).) The approximate date of the destruction of the workshop can be inferred from other material which belonged to the Isin-Larsa and Old Babylonian Periods found at the site (al-Gailani, 1965: 33, 35). An exact date for the workshop is not important as the implements found undoubtedly testify to a long-standing metallurgical tradition. A date for the destruction of the workshop during the first quarter of the second millennium BC seems perfectly plausible.

In publishing the clay objects from the coppersmiths' workshop L. al-Gailani (1965: 37) included a report by W. Winton of the Science Museum who identified the objects from photographs supplied to him. Some of the identifications were quite straightforward, but a number presented difficulties which only an inspection of the artefacts themselves could solve. Such an examination was made by the author in 1977 and the results are significant enough to warrant further publication.

The author is grateful to the Director-General of Antiquities of Iraq for permission to study the artefacts found at Tell edh Dhiba'i and while in Iraq he particularly appreciated the assistance rendered by the Director of the Museum Baghdad and his staff. The author also gratefully acknowledges the assistance of Dr N. J. Seeley of the Institute of Archaeology, London, and of Mr Ian Edwards of Melbourne who commented

Fig. 1 Metalworkers depicted in the reliefs in the tomb of Mereruka, Saqqara (after Duell).

on the ceramics; also the travel grant awarded by the British school of Archaeology in Iraq and the support and encouragement provided by members of the school.

1. Bellows (Fig. 2, Plate I, a)

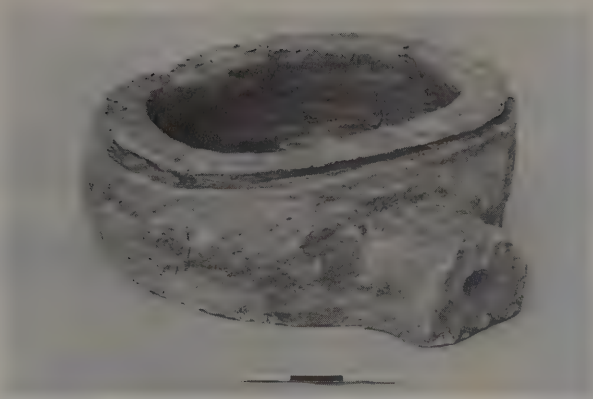
The largest objects found in the debris of the workshop were two pots which were used as bellows. The two bellows were similar in size being about 0.45 m in diameter and 0.16 m high. Field numbers were missing from the vessels and have been allotted with reference to the photographs previously published by L. al-Gailani (1965: pl. 7). Inspection of the pots revealed them to be handmade from medium-fine clay which was then hardened by fire probably to a temperature around 500°C

Pot bellows, including these examples, have been discussed elsewhere in more detail by the author (1979; Arieh *et al.,* 1978: 175, Fig. 3. Plate 45). There appeared to be no reason why the pair of bellows could not have been operated reciprocally by the feet as depicted in the New Kingdom Tomb of Rekhmirē, Thebes (Davies, 1943: Plate 17), and as suggested by the author (1979: 110, Fig. 5).

2. Crucibles (Figs. 2 and 3, Plate Ib, c)

A total of five crucibles and one fragment of a crucible were found at Tell edh Dhiba'i. Their condition varies from good in the case of the unused crucible 8 to very fragile for those at the end of their operational life.

The crucibles are very similar in size and shape and in fact crucibles 7 and 4 are almost identical as are crucible 8 and the fragment 5. The remaining two crucibles were slightly larger than the others. The uniformity would suggest that the crucibles were made by hand with the aid of a concave mould which formed the basic curved shape.



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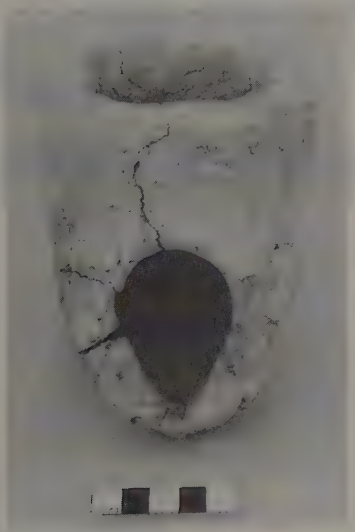

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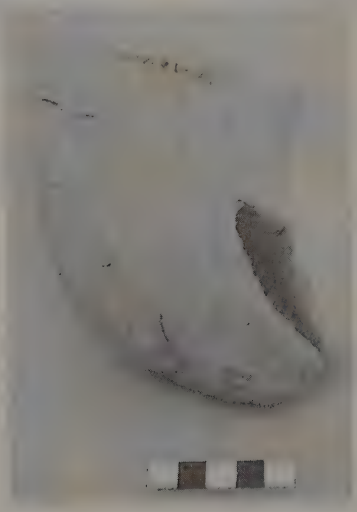

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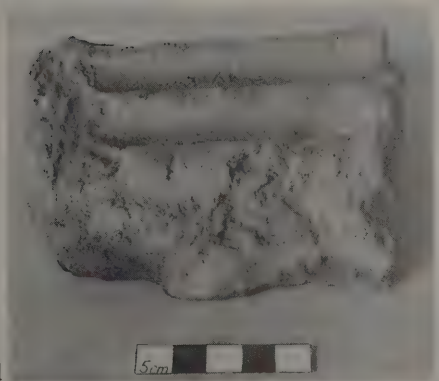

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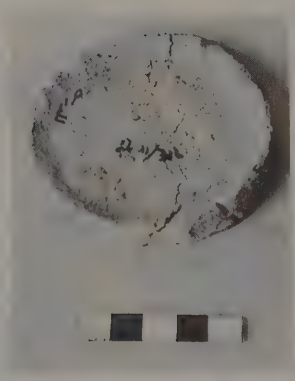

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Plate I a, 614/1 pot bellows; b, IM65801 crucible; c, IM65797 crucible; d, IM65794 mould; e, 614/13 dish.

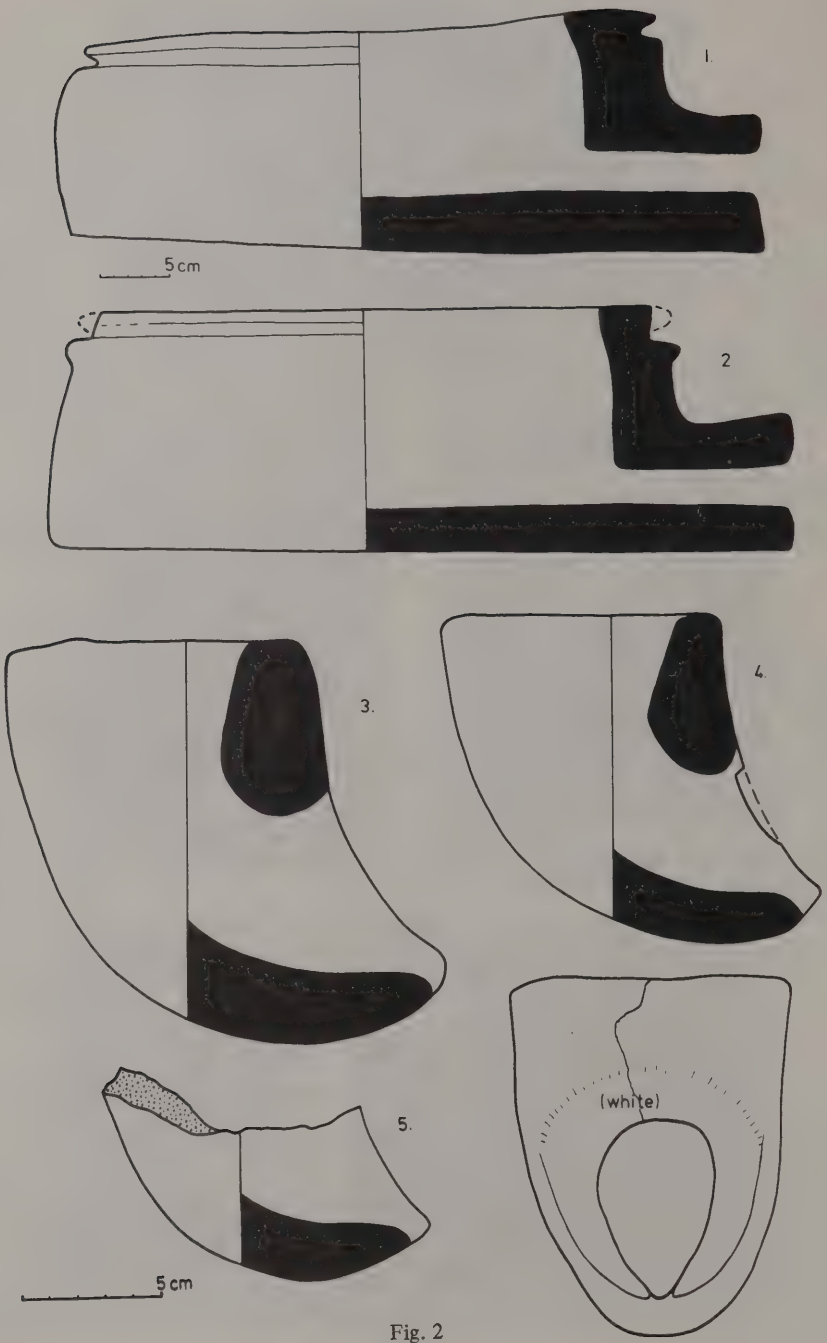


Fig. 2

Fig. 3

The fabric of the crucibles is fairly coarse containing silica and having holes left by straw which was consumed during firing. It is estimated that the vessels were fired to about 800°C and the exterior of the unused crucible seems to indicate that towards the end of firing they were subjected to oxidising conditions. The material from which the crucibles were made is therefore a very effective insulator and appropriate for a vessel intended to contain molten metal.

A fragment of corroded green material on the inside of crucible 4 was analysed by X-ray fluorescence, revealing that it contained copper, tin, arsenic and traces of iron and nickel. The crucibles were therefore used for the melting of bronze.

On most of its surface, crucible 4 (Plate I, b) has the normal pink tinge but around the area of the side opening it is white and friable. This variation indicates that the crucible was subjected to repeated applications of high temperatures in the immediate vicinity of the front opening which had burnt the clay out leaving a material with a high silica content and little bonding strength. If this observation is correct, then the front of the crucible was located in the hottest part of the furnace.

The operation of the crucibles presents a problem as it is clear that in their upright position they will not contain a liquid. Winton proposed that the crucibles were placed in a lying down position in the furnace until the metal melted and then were carried by a metal hook and manipulated with a pair of tongs when being poured (al-Gailani, 1965: Plate 6). Although this suggestion is not corroborated by the observations made with respect to the heat markings on the crucible, it is not entirely unlike that proposed by Tylecote (1976: 18, Fig. 11) for a Late Bronze Age crucible found at Keos.

The crucible from Keos is similar to one found at Byblos (Dunand, 1958: 847, Fig. 962 – Reg. No. 16653) and another found by Petrie in Sinai probably belonging to the same period (Petrie, 1906: 162, Fig. 161). However, these crucibles differ from the Tell edh Dhiba'i crucibles in that they are shaped like a bowl with a hole in the side so that in an upright position they would contain a reasonable amount of liquid. The Tell edh Dhiba'i crucibles would appear to be the only extant crucibles of their kind.

The technique of casting associated with the Tell edh Dhiba'i crucibles is probably best illustrated by reliefs in some Fifth Dynasty Egyptian tombs. The best preserved are those in the tomb of Mereruka, Saqqara (Fig. 1) (Duell, 1938: Plate 30) which depict both the melting and casting processes. Similar reliefs have been found in the Mastaba of Wep-em-nefert at Giza (Hassan, 1936: 192, 193, Fig. 219).

The reliefs reveal that melting is performed in two crucibles placed back to back and with six men using blowpipes aimed at the charcoal placed in front of each crucible. After the metal was melted the crucible was taken to the mould, held with the assistance of two stones or lumps of clay and then a blockage in the mouth of the crucible was removed to allow the metal to discharge into the mould. It is probable that at Tell edh Dhiba'i a technique similar to this was adopted with modifications to allow for the pot bellows and for different moulding equipment.

The crucibles in the Old Kingdom tomb reliefs are identical in shape to those of Tell edh Dhiba'i and must have been very common in Egypt because the shape gives rise

to the symbol used by the Egyptians to signify copper. During the Old Kingdom this symbol resembles two crucibles while in the New Kingdom it became the shape of a single crucible (Gardiner, 1957: 490, 529. The suggestion that the shape is an 'ingot of copper' must now be amended to crucible. See Davey, forthcoming in *JEA*).

3. Open moulds (Figs. 3 and 4, Plate Id)

A number of fragmentary open moulds were found within the workshop. They were all made from a coarse clay which had been briefly fired and are at first glance rather unexciting, particularly when compared with the stone moulds found in some other Ancient Near Eastern sites.

Moulds 9 and 14 contain matrices for long narrow objects which when cast would have had a 'D'-shaped cross-section. These shapes may then have been worked into knife or dagger blades. However, as there are a large number of these shapes on the moulds here and elsewhere, it is more likely that the objects were in fact bar or ring ingots used for trade (Tylecote, 1976: 16). Bars were a very practical way of handling metal because, unlike plano-convex ingots, they could be easily carried in the form of a ring and could be broken without difficulty by the metalsmith when the metal was to be cast. Mould 10 is similar to 9 and 14 but is for a larger object which again could be either an ingot or an implement such as a knife or sword.

Mould 11 is for a flat object which was probably worked into a vessel of some kind. A similar shape is to be seen on a clay mould found at Byblos with Registered No. 11124 (Dunand, 1954: 420, Fig. 444). This mould fragment is similar to those seen by the author which have come from the Old Kingdom town of Buhen in Nubia.

Object 18 has tentatively been called a mould, although its thin sides are uncharacteristic for moulds of bronze. It may possibly have been used for a material with a lower melting point such as gold, silver or lead.

4. Mould cover (Fig. 4, Plate IIa)

Object 12 and a fragment (not illustrated) were not identified by Winton who it appears could not gauge the relative sizes of objects from the photographs (al-Gailani, 1965: 38–614/9). The object is in fact a mould cover which fits exactly over the fragment of mould 14. This cover would have been placed over the mould and covered with charcoal in the furnace (see Fig. 6). Mould covers were used because they inhibited oxidation of the surface of the casting and by allowing the mould to be heated in the furnace, the solidification of the metal was retarded allowing it to flow more freely into the mould. Mould covers have been found and recognised in Europe and the Agean, but never before in the Near East (Coghlan, 1968: 73). The design of the examples from Tell edh Dhiba'i is probably the result of a highly developed tradition which found it necessary to place a raised collar on the cover to make it easier to clear the charcoal away from the opening when a metal pour was to be made.

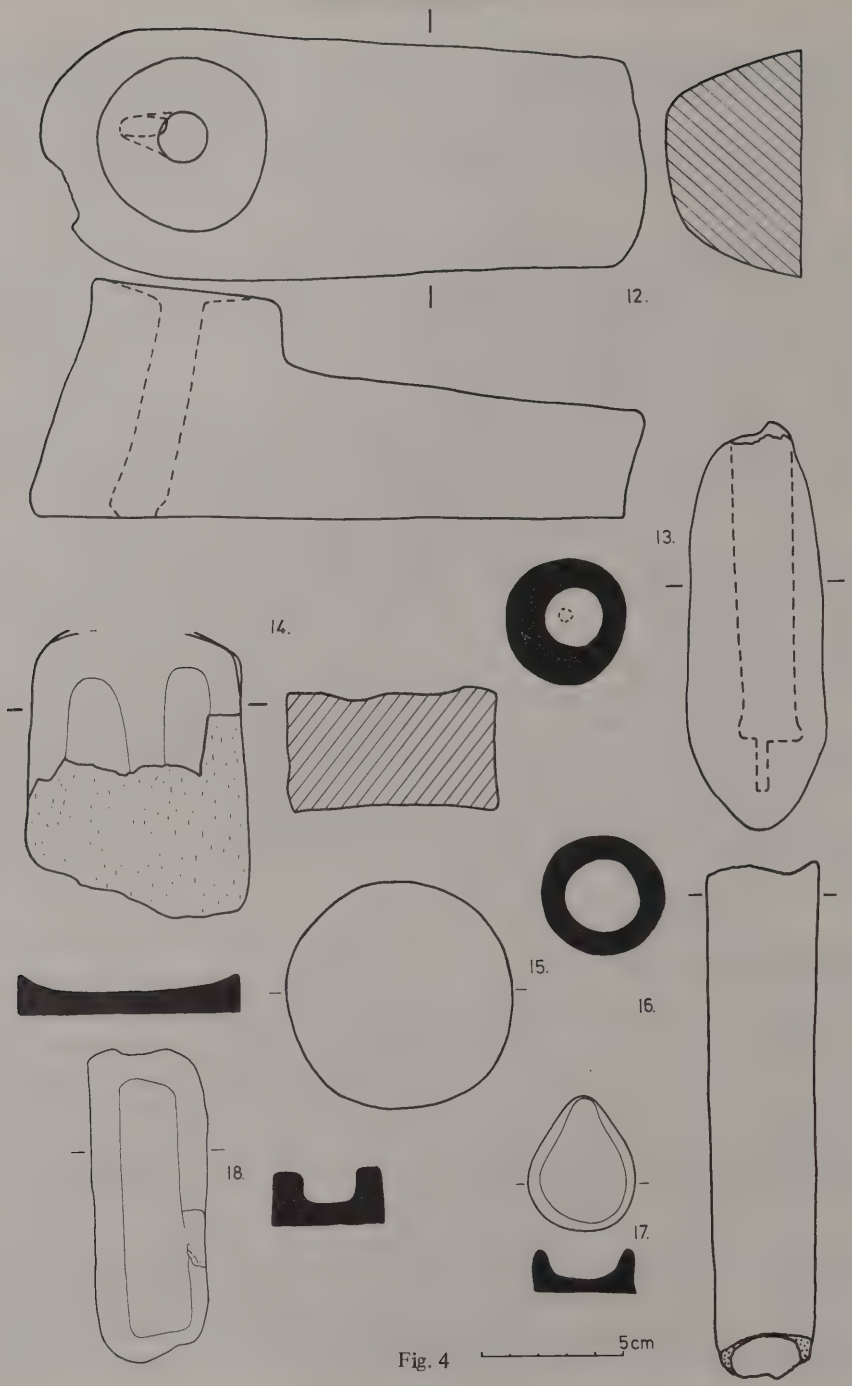
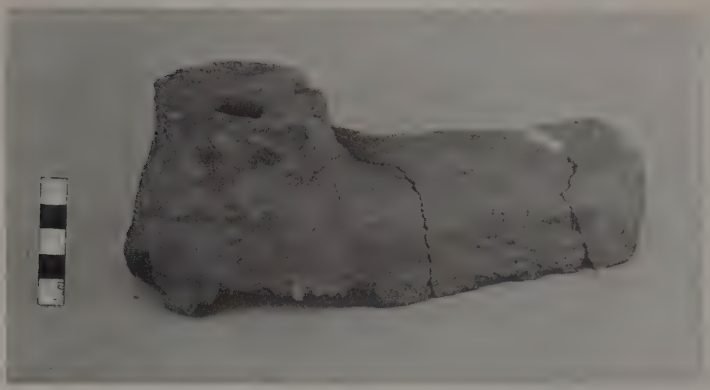


Fig. 4



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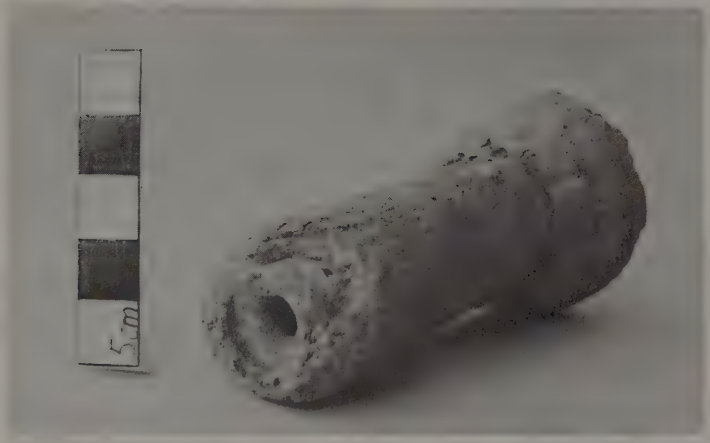

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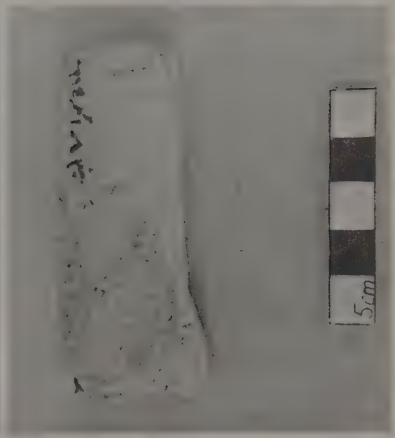

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Plate II a, IM65787 mould cover; b, 614/19 *cire perdue* mould; c, IM65791 pattern; d, 614/18 core.

5. *Cire perdue mould* (Fig. 5, Plate IIb)

Object 19 was identified as a *cire perdue* mould in which a short pin was cast (Winton thought it to be a funnel for conducting air to the bellows (al-Gailani, 1965: 38)). The mould was made from two distinctly different types of clay; the inner cylinder surrounding the pin of fine yellow clay and an outer shell of coarser buff-coloured clay. The bottom of the mould has been broken although it appears not to the extent necessary to extract the pin. The mould was therefore unused. The unbroken end of the mould is funnel-shaped indicating that it was placed in or by the furnace in a vertical position with the funnel end uppermost.

Cire perdue casting is known from existent metal artefacts to have been practised in the Ancient Near East from the fourth millennium BC or even earlier (de Jesus, 1980: 43; Hunt, 1980: 63; Lucas, 221–2). However, *cire perdue* mould fragments are not commonly found. A couple of clay fragments found at Hazor in northern Palestine may have been *cire perdue* mould fragments used for casting the horns of a bull (Yadin, 1958: 30, 31, Plate 98). The object cast from these may have been something like the horns of a bull also found at Hazor (Yadin, 1965: Plate 341). It has been suggested that mould fragments from Poliochni and Thermi may be from *cire perdue* moulds (de Jesus, 1980: 41, Fig. 15; Branigan, 1974: 82, Fig. 4). The axe head mould from Poliochni (Bernabò Brea, 1964: Plate 85d) may quite probably have been formed with the aid of wax, although without inspection it is impossible to be definite.

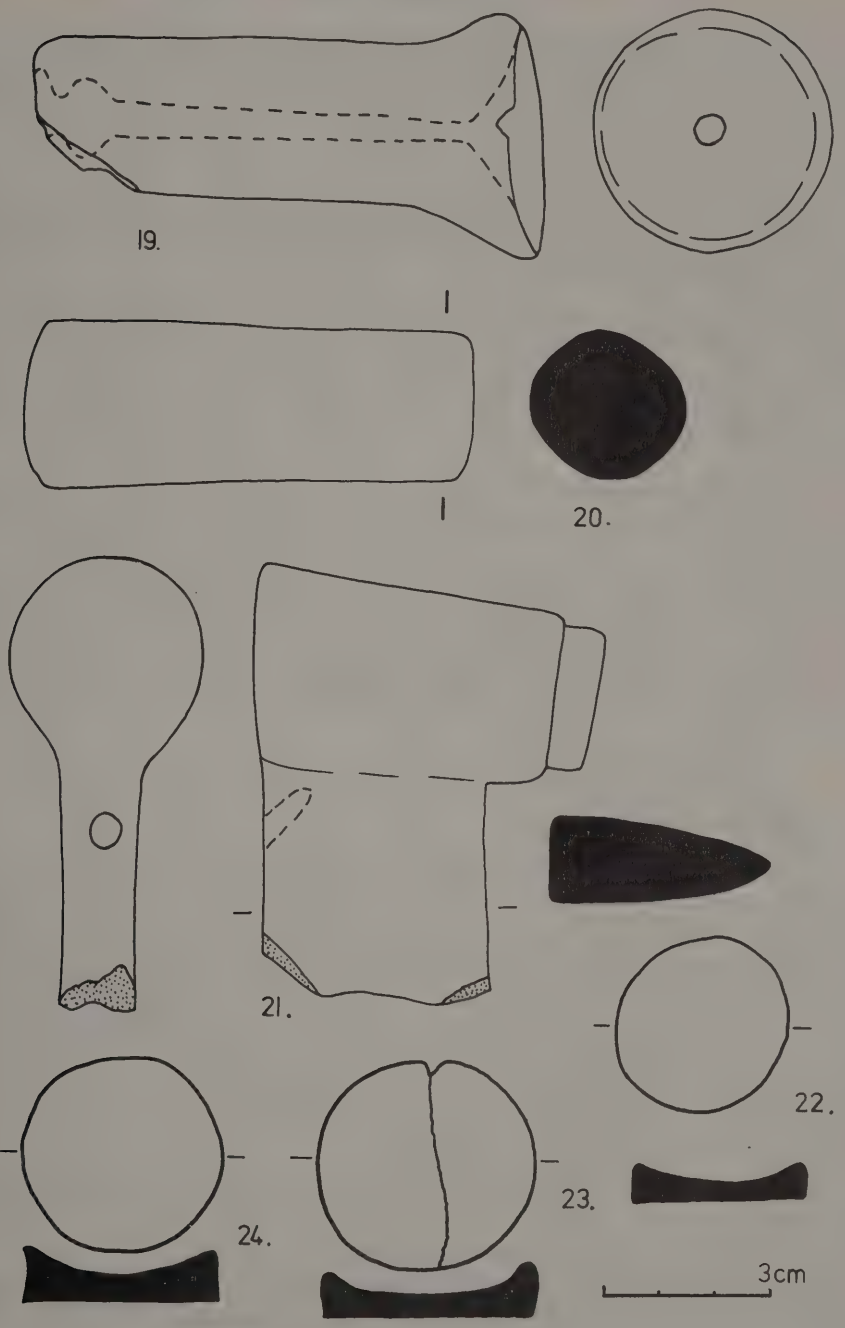
Cire perdue moulds have been found in abundance at a Roman site, Gussage All Saints, Dorset, where they were used to fabricate components of horses' bridles (Wainwright, 1979: 125–53; Foster, 1980). However no definite pre-Roman *cire perdue* moulds appear to have been examined and identified as such. This may be expected as such moulds are always shattered after use and it is unlikely that archaeologists would consider the fragments worth publishing even if they were recorded during excavation.

Cire perdue moulding is described by a number of writers (Tylecote, 1962: 110) and need not be explained here. Descriptions of early Indian casting and observations of present-day practice reveal that the moulds are made in a number of stages (Krishnan, 1976: 4, 13–15). A fine slurry was initially applied to a wax model and after it had dried a second coat of fine clay was added. Finally, a third layer of coarser clay was added to strengthen and protect the mould. Lucas describes a similar process of *cire perdue* moulding in classical Egypt (Lucas 1962: 221).

The mould from Tell edh Dhiba'i was made in at least two states indicating that the tradition common elswhere at a later period was already well established in Mesopotamia during the Old Babylonian Period.

6. Sand casting (Fig. 5, Plate IIc, d)

The discovery of a clay model of an axehead, 21, testifies to the forming of moulds in loose material. Although the blade of the pattern is broken, a clear indication of its


19.
20.
21.
22.
23.
24.
3cm

operation can be deduced. The model of the axehead is shaped so that it can be impressed into a bed of material such as clay or sand and after it is withdrawn leave a stable impression of itself. The pattern could be held by inserting a handle into holes in the edge of the blade. One hole is visible and there was probably a second further down the blade inclined in the opposite direction.

The identification of the pattern was largely confirmed by the discovery of a core, 20, which would have been inserted into the hole left for it by the pattern so that it formed the shafthole in the axehead.

The nature of the moulding material used in connection with the axehead pattern found at Tell edh Dhiba'i cannot be determined from the pattern itself. It is generally believed that sand casting commonly used in foundries today was a technique developed in the 18th century AD (Tylecote, 1962: 110). Theophilus, however, described the use of clay as a casting medium in the 11th century AD (Hendry 1847: 313, Agricola, 1950: 405, 536).

The Biblical description of the manufacture of the bronze objects for the temple of Solomon states that it was executed by a metalworker from Tyre who cast them 'in the compactness of the soil' (1 Kings 7: 46). This is generally translated as 'in the clay ground' (Revised Version) although the Jerusalem Bible actually refers to 'sand casting'. The Bedouin today, quite independently of industrial Europe, have a tradition of using loose earth for casting (Weir, 1976: 67) and there is no reason why metalworkers during the Old Babylonian period could not also manufacture a waterless, sand–clay mixture into suitable material for casting.

7. Miscellaneous objects

One object, 13, which was possibly a mould was made by a slightly different method. Winton states, 'The inside is filled with burnt wood. A handle grip, or possibly, a one piece mould in the course of preparation. An object could have been first carved in wood then "invested" with clay and baked in the fire. In the process of firing the wood would burn completely away leaving a clay mould of the original shape of the wood carving' (al Gailani, 1965: 79). While he goes on to say that this is very conjectural, an inspection of the object itself has not inspired any other explanation. If the small hole which continues from the end of the larger hole broke through to the end of the object, it would probably be the clay nozzle of a blowpipe (see Fig. 1).

A number of small flat round dishes, 15, 22, 23, 24, are in the collection. Some of them have a green and brown slag on their surfaces indicating that they were subjected to considerable heat. It is suggested that these objects were used in connection with the manufacture of jewellery for such processes as welding or soldering.

A pipe, 16, made from clay was found and seems to have been used for conveying air into the furnace. It was full of charcoal and this may have been a normal state of affairs. As the air passed through the burning charcoal in the pipe it would have been pre-

heated so that when it reached the furnace it would not reduce the temperature. The material not illustrated was undistinguished and does not warrant comment.

Discussion

The equipment found in the workshop at Tell edh Dhiba'i provides us with an insight into the techniques of an Old Babylonian metalworker. The operation of the equipment is not entirely straightforward and the reconstruction of a melting furnace postulated in Fig. 6 is not the only alternative.

The suggested furnace is sunk into the ground so as to provide maximum insula-

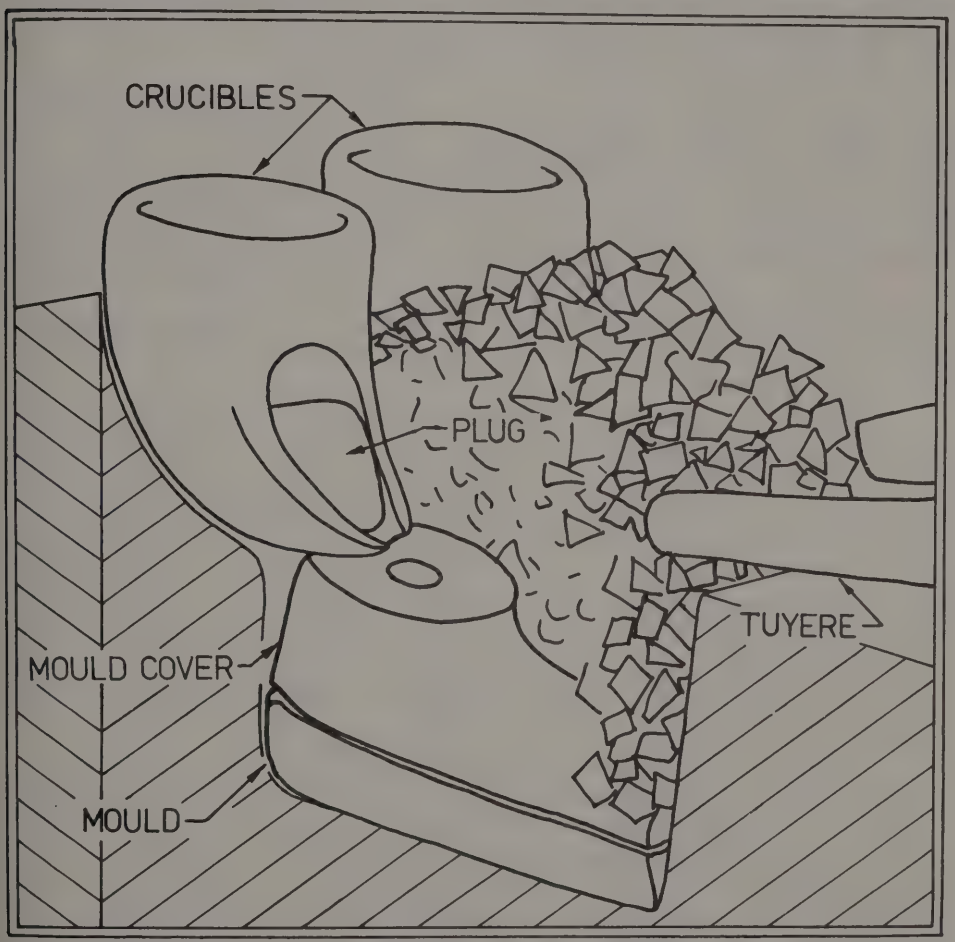


Fig. 6 A cutaway reconstruction of the proposed melting furnace using the crucibles, mould covers and moulds.

tion. Adopting the practice illustrated in the Egyptian Old Kingdom tomb reliefs, a plug is placed at the entrance of the crucible and it is kept in place until the material is ready to pour. When that occurs, the charcoal is quickly pushed aside and the plug removed so that the metal can quickly flow into the pre-heated mould. Two crucibles are shown side by side in the illustration as there appears no reason why a number of pours could not have been made in quick succession.

The main design principle of this melting furnace is that of fuel efficiency. In Mesopotamia charcoal had to be brought considerable distances and so it was necessary to carefully control its consumption. The shape of the crucible and its operation in conjunction with large bellows meant that the metal could be melted and poured with a minimum amount of charcoal as all the heat was forced directly toward the metal itself. The pre-heated mould and its position ready for the pour meant that very little super-heat was required by the metal to obtain a successful casting.

A number of connections with Egyptian metallurgy have already been mentioned. The shape of the crucibles is the most definite connection with the Old Kingdom metallurgy. No parallels for the Tell edh Dhiba'i crucibles have appeared in the Ancient Near East to the present and if it were not for the reliefs in such places as the tomb of Mereruka at Saqqara, their mode of operation would be a mystery. The moulds have similarities in their construction with those found at the Old Kingdom town at Buhen and some shapes on the moulds parallel those found at Byblos, where there were long periods of Egyptian control and influence. The transfer of ideas was not in one direction only as the New Kingdom tomb of Rekhmirē depicts bellows of the Tell edh Dhiba'i type used by Egyptians.

It may seem strange that metalworking equipment from neighbouring Anatolia and Iran do not find a place in the Tell edh Dhiba'i collection. These regions had trade links with Mesopotamia which involved transfer of metal, some of which may have been processed in the workship at Tell edh Dhiba'i. Yet instead of moulds, crucibles and bellows of the type found in the workshop at Kültepe (Özgüç, 1955: 79) the metalworker at Tell edh Dhiba'i used equipment which clearly reflects an Egyptian technology. This relationship seems all the more strange because, with the possible exception of some moulds from Byblos ((Dunand, 1954: Fig. 444), No. 11124 is one example reminiscent of material found in the Old Kingdom town at Buhen), there are no sites between Egypt and Mesopotamia with metallurgical equipment similar to Tell edh Dhiba'i which would reveal how the technology was transferred.

The answer for this occurrence is probably to be found in the similar environmental constraints experienced by the metalworker in Egypt and most of Mosopotamia. Both found their fuel supply severely limited and expensive and so it is reasonable that they should use similar equipment which made the most efficient use of their resources. Metalworkers in Anatolia, Iran and the coast of the Levant had no such restrictions and could use large and easily operated furnaces which were comparatively inefficient. Technological practices can travel large geographical distances, it seems, and only be applied in places where the circumstances are conducive or relevant to those practices.

Tell edh Dhiba'i is quite important in terms of the history of metalworking for it has yielded one of the earliest known *cire perdue* moulds, the earliest evidence for clay–sand casting, the only mould covers known in the Near East and foot-operated pot bellows known from a later period in Egypt. While in the course of time other earlier examples will no doubt be discovered, the Tell edh Dhiba'i workshop will remain significant because of the distinctive nature of the Old Babylonian metalsmith who did not use stone moulds common to the Levant and northern Mesopotamia (Davey, 1977) or the open crucibles of the Levant, Anatolia and Iran (Tylecote, 1976: 20), but used moulds formed from loose earth and baked clay and closed crucibles known from Egypt.

In retrospect it seems appropriate to pay tribute to the excavators of Tell edh Dhiba'i who kept all the fragments of unattractive industrial refuse in spite of the fact that at the time the identification and purpose of some of the objects was not clear.

Abstract

A collection of metalworker's tools found at Tell Edh Dhiba' in Iraq in 1965 is described and its significance for providing information about the techniques used by ancient metalworkers in Mesopotamia is discussed. These are shown to resemble those of Egypt rather than, as might have been expected, those of neighbouring Anatolia. It is suggested that the explanation may lie chiefly in the similar environmental constraints in the two areas.

Catalogue of objects

Drawing No.	Excavation No.	Iraq Museum	Identification	Size (mm)
1	614/1	–	Pot bellows	400 dia. 180 ht
2	614/2	–	Pot bellows	450 dia. 180 ht
3	614/4	IM65798	Crucible	110 dia. 150 ht
4	614/7	IM65801	Crucible	100 dia. 120 ht
5	614/8	–	Crucible fragment	
6	614/5	IM65799	Crucible	130 dia. 140 ht
7	614/3	IM65797	Crucible	100 dia. 110 ht
8	614/6	IM65800	Crucible	90 dia. 110 ht
9	614/27	IM65794	Mould	120 × 90 × 35
10	614/28	IM65795	Mould	160 × 70 × 45
11	614/12	IM65789	Mould	100 × 90 × 35
12	614/9	IM65787	Mould cover	210 × 90 × 85
13	614/15	–	Mould	140 × 45 dia.
14	614/14	IM65790	Mould	110 × 80 × 40
15	614/13	–	Dish	80 dia.
16	614/16	–	Pipe	180 × 40 dia.
17	614/11	–	Measuring dish	50 × 40 × 15
18	614/10	IM65788	Mould?	110 × 40 × 20
19	614/19	–	*Cire perdue* mould	90 × 40 dia.
20	614/18	–	Core	80 × 25 dia.
21	614/17	IM65791	Pattern	60 × 75
22	614/31(21)	–	Dish	30 dia.
23	614/20	–	Dish	40 dia.
24	614/22	–	Dish	35 dia.

Other objects in the collection but not illustrated.

614/–	IM65758	Lamp	Provenance uncertain
614/23	IM54793	Pot spout	
614/32	–	Mould cover fragment	
–	–	Rim sherd	Provenance uncertain
614/29	IM65796	Pottery wheel hub	Incomplete
614/30	IM65802	Pot	
614/25	–	Roof material	
614/26	–	Roof material	
–	–	Mould	Small fragment

Also some pottery fragments including a rim sherd, body sherds from a well-fired pot and a strainer pot and a few indistinguishable pieces of clay.

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Chisel-ended Arrowheads from Tell Hadidi, Syria

by R. MILLER

Recent excavations at Tell Hadidi, Syria, by a Milwaukee Public Museum expedition (Dornemann, 1978, 1979) have provided clear evidence of the use of obsidian microliths as chisel-ended arrowheads in the early second millennium BC, extending both the chronological and geographical range of this type of arrowhead. The three pieces illustrated were recovered together from the defensive ditch around the early second millennium BC town, where they may have fallen as part of a shower of arrows either covering or fending off an assault on the city's defences.

One arrowhead is still set in its haft. The other two arrowheads are broken, either chipped on the tip or broken down the middle, showing two types of impact fracture associated with this type of arrowhead. Invasive retouch resulting from impact damage has also been noted in the archery experiments with transverse arrowheads by C. Bergman and N. Barton (pers. comm.).

An X-ray of the hafted arrowhead revealed a gap between the back of the microlith and the tip of the foreshaft, filled with plaster to cushion the stone from the force of impact, a feature of this type of arrowhead also noted in Egyptian and Bushman examples (Clark *et al.*, 1974: 334; Clark, 1977: 145), and now shown for the first time in western Asia. Analysis of the hafting material by R. Clough showed that gypsum plaster had been used.

All three arrowheads are made from obsidian bladelet segments which have been truncated and backed by direct retouch. Part of the midrib of the bladelet used as a tool blank is still visible on the piece preserved in its haft. The same technique of manufacture was used on four other contemporary obsidian geometric arrowheads recovered elsewhere on the site and obsidian bladelet segments were discovered in contemporary early second millennium BC contexts at Hadidi. These bladelets were of uniform width and thickness and could readily have been worked up into new arrowheads by archers as the need for replacements arose, somewhat as flakes used as cores for gunflints were carried by fusiliers 200–300 years ago. As a quiver of arrows is quickly used up in warfare, the shafts of arrows shot in the opposite direction could be gathered up and fitted with new points mounted with quick-setting gypsum plaster without much loss of time, a useful consideration in warfare. All archers would have needed to carry would

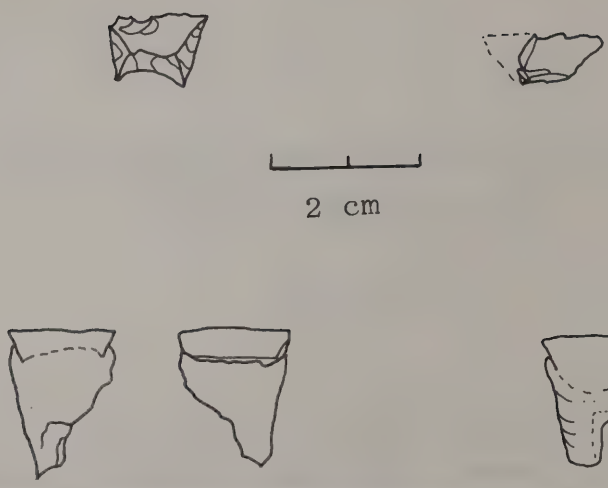

Fig. 1 Chisel-ended arrowheads. Details of hafted example drawn from X-ray. Drawings by R. and J. R. Miller.

be a supply of bladelets or microliths and powdered gypsum plaster, to be ready to replace the arrows they had already shot.

Although the Hadidi arrowheads are the first chisel-ended arrowheads reported from post-Natufian contexts in this area of Syria, chisel-ended arrows were in widespread use in the ancient Near East from the late fourth millennium BC in both Egypt and Mesopotamia (Fleisch, 1962). Most of the evidence comes from art work. The use of chisel-ended arrows in hunting and warfare is depicted on Predynastic Egyptian palettes (Clark *et al.*, 1974) and in Middle Kingdom tomb paintings (Newberry, 1893: Pls 13 and 14), as well as on Uruk-period seals and sculpture (Moortgat, 1940: Pl. 1; Moortgat, 1967: Pl. 14; Mallowan, 1964).

However, actual chisel-ended arrowheads can rarely be identified in the lithic assemblages from excavated sites, partly because of the difficulty of determining the function of microliths which could be used for a variety of purposes, not just as arrowheads (Tixier, 1963: 43, 113, note 2; Clark *et al.*, 1974: 323, note 2). Thus, even though geometrics which could have been used as arrowheads occur at Tepe Hissar in early second millennium BC contexts contemporary with the chisel-ended arrows from Hadidi (Bulgarelli, 1974: 18), and although geometrics continued in use in the Arabian peninsula down to the second half of the first millennium BC (Caton-Thompson, 1944: Pls 58 and 60; Miller, 1980: 101, Pl 68:6), these cannot be taken as examples of chisel-ended arrowheads without further evidence of having been hafted or used as arrowheads.

Where the wooden shafts have been preserved, hafted examples of chisel-ended arrowheads are known from tombs in the Nile Valley from the late fourth millennium BC to the mid-1st millennium BC (references in Clark *et al.*, 1974). A Middle King-

dom arsenal stocked with this type of arrow was excavated in a fort at Mirgissa (Vercoutter, 1967–8: 270).

Although in some cases it may still be possible to identify geometrics originally used as arrowheads even where the cane or wood arrowshafts are no longer extant, especially where a bundle or quiverful of arrows is involved (Lenzen, 1959: 10, Pl 19a; Woolley, 1934: 160, 553), the chisel-ended arrowhead from Hadidi still set in its haft is at the moment a unique example of an arrowhead of this type from western Asia where the hafting medium has been preserved. It is fortunate that gypsum is abundant in the Euphrates valley region, as this inorganic hafting material had a better chance of being preserved than the organic resins probably used to stick geometrics onto arrowshafts in other regions.

Abstract

Three chisel-ended obsidian arrowheads, one of them still set in its gypsum haft and two showing impact damage, have been excavated from an early second millennium BC defensive ditch at Tell Hadidi, Syria, providing evidence for the use of this type of arrowhead in warfare in the ancient Near East at this time.

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Recent Progress in Dendrochronology: A Review Article

by D. J. SCHOVE

Tree-Ring Dating and Archaeology. M. G. L. Baillie. London, Croom Helm, 1982. 274 pp., illust. £16.95.

Climate from Tree-Rings. M. K. Hughes, P. K. Kelley, J. R. Pilcher and V. C. Lamarche (eds.). Cambridge, 1982. 223 pp., illust. £18.50.

Making Wood Speak: An Introduction to Dendrochronology. Y. Trenard trans. K. E. Langton. *Forestry Abstracts*, Oxford, **43** (12): 729–759. Reprints available from Commonwealth Forestry Bureau, Oxford, 1982, £2.

Dendrochronology had developed rapidly in the past 20 years and remarkable progress has been made in Ireland as Baillie's book makes clear. About 1950 I appealed, in a lecture at Dublin University, for studies of tree-rings as a possible check on the dating of the Irish Annals; I was told by botanists that the winters were so mild and the summers so cool that the trees would not distinguish the seasons and that there would be frequent missing or double rings. A few years later Watts at Dublin (whose thesis is not mentioned here) investigated fossil trees on the bogs and proved that cross-dating was possible and I was enabled to exhibit one of his 5th-century sections at the British Association meeting at Glasgow. In the sixties Queen's University at Belfast (with collaboration from Dublin) took the initiative, utilising the fossil tree-trunks so frequently appearing in the construction of motor roads and studying such specimens of historical timber as had survived.

Dendrochronology in the fifties was a little more advanced in England than in Ireland – we could date some 13th century drought-sensitive oak and get back to AD 850 with a suspected error of about five years, but even in the seventies all our attempts to date earlier Saxon (or Roman) timber had failed. Our dates for the water-mill at Old Windsor had been unsuccessful in 1958 and they were still unsuccessful in 1978 when I misguidedly gave preference to a radiocarbon date over my computer match with the Continent (cf. Schove, 1978, 1983a). In the meantime horizontal water-mills had been found in Ireland (see Baillie's Appendix II and p. 191) and the Belfast dendrochronologists cross-dated the ring patterns with the problematical Old Windsor and other Anglo-Saxon timbers (see Chapter 9). J. Fletcher (1981) provides correct dates for English examples of Roman and Saxon timbers, which can now be dated (using a variety of

methods) back to *c.* 200 BC. Baillie himself has published (in the *Tree-Ring Bulletin*) several chronologies for the present millennium in Ireland and Scotland, whereas Pilcher is preparing a chronology for oak through the last 7,500 years (see p. 199). Part of this has been published (Pilcher *et al.*, 1977) and can, I suggest, be cross-dated with Bristlecone dates dated 4018–1080 BC (Schove, 1983a, Paper 40). Since this book was published, Irish series have been partly matched by computer with the Continental series developed in Germany by Becker and Schmidt. In 1982 these Continental series, which also have gaps, reached an absolute date of *c.* 7200 BC (*c.* 9150 BP) which was found to correspond to a radiocarbon date of *c.* 8250 bp (Bruns *et al.*, in progress). Certainly the absolute dendrodates of English prehistoric sites such as those of the Somerset Levels will continue to depend on matches with the German and the Irish series. Baillie and Pilcher provide a 'British Isles' chronology back to AD 401 in the *Tree-Ring Newsletter*, 1983, Belfast, No. 22, that will be useful for computer matching.

The latest developments in dendroclimatology are discussed in 'Climate from Tree Rings'. For archaeologists the most exciting development is that by Schweingruber and his students at Zurich (see p. 8), who are preparing time-series of X-ray densitometry measurements which respond very reliably to late summer (July/Sept) temperatures. Since 'Climate from Tree-Rings' was published, Renner (1982) has thus provided what amounts to temperature curves for much of the Holocene and reprinted in Schweingruber (1983: 173); some of his curves are given absolute dates by the reviewer in Schove and Fairbridge (1984). Such curves throw light on the changing environment and at the same time provide an independent or *climatic* method of absolute dating. From this and other series (cf. p. 126 LaMarche and see Schove and Fairbridge, 1984) we can infer that the summer temperature sequence in the North Temperate Zone was as follows:

Warm	2000–1870 BC
Cool	1875–1740 BC
Warm	1740–1670 BC
Very cold	1670–1510 BC
Warm	1510–1270 BC
Cold	1270–900 BC

Rainfall chronology is meanwhile being developed in the Middle East, in Israel back to AD 1000 (Klein in Schove and Fairbridge, 1984) and in Turkey for the period 1500–750 BC (Kuniholm cf. Schove, 1983a, Papers 39 and 40). In NW Europe many tree-ring series reflect rainfall or pressure (inversely) and Pilcher and others (1983) have begun climatological reconstructions for Europe for comparison with those made in the New World by Fritts (1976).

An excellent summary of dendrochronology (to 1978) in Europe is given in the third work under review which has been admirably translated from the original French. Some new work from Europe is available in PACT publications (PACT, 1982 and 1983). Palaeomagnetic chronology of varves and tree-rings considered in Creer *et al.* (1983;

cf. Schove, 1983b, and Schove and Fairbridge, 1984) provides a high-precision chronology of both the Late Glacial and the Holocene, and radiocarbon date calibration can be extended with a possible error of one to two centuries back to 12,500 bp. Dendrochronology in archaeology has not always yielded quick results, but the rapid progress exemplified in these three works (and the other papers cited) ensures that tree-ring analysis will be of prime importance in the future.

A European journal *Dendrochronologia* is shortly to be published by Archaeonatura at Verona, Italy, and important articles from the Hamburg laboratory (Eckstein, Aniol, etc.) are expected to appear in Volume I. *Soviet publications* in *Dendrochronology* I, edited by V. C. La Marche, Jr, is available at a cost of $9.00 US from Mrs A. K. Allen at the Laboratory of Tree-Ring Research, University of Arizona, Tucson, Arizona 85721, USA. Comparisons between tree-ring and radiocarbon dates (Stuiver, 1982) for the AD period are tabulated in Schove (1983, Appendix C) and further studies of Holocene comparisons will be made by Pilcher and others at Belfast using the wide tree-rings of Irish oaks.

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Note: Kuniholm's (1983) paper on dating in the Aegean region will be published in Eckstein, D., Wrobal, S., Aniol, R. W. (eds.) *Mitt Bundesforch Ast Forst-u Holwirtschaft Hamburg.* A discussion of its relevance to possible dates of the Santorin eruption 1479 or 1349 BC is given in my essay review in *International Journal of Nautical Archaeology and Underwater Archaeology* (forthcoming) but correct dates may soon be available from a South Greenland ice-core at Dye 3.

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Book Reviews

Museums of the world, 3rd rev. edn. Munich, Saur, 1981. 623 pp. £88.00.

The third revised edition of *Museums of the world* published by K. G. Saur is a useful tool. It is comprehensive, listing museums in 163 countries, but remarkably light and easy to handle. The type is clear and the lay-out convenient. In this edition the countries of the world are listed alphabetically, not segregated into continents, a help to those whose geography has blank spots. (Is Cyprus in Europe or Asia?) The countries are given their English form; under each country heading the museums are listed alphabetically by town or site, and then by name; town and name appear in the language of the country concerned. Each museum is characterised according to 15 subject or administrative types (Agriculture Museum, Anthropology Museum, Archaeology Museum; Historic Site, Open Air Museum, etc.) and a few further details of holdings are given.

There is an extensive subject index at the back which directs the enquirer by country and place, as well as by entry number, to the museums dealing with the type of object he may have in mind. For the archaeologist there are entries under Archaeology; Archaeology, Far Eastern; Archaeology, Ibero-American; Archaeology, Near and Middle East; Christian antiquities; Classical antiquities; Historical ruins; Man, Prehistoric; Marine Archaeology. But there are also many entries under related subjects such as Bronzes, Numismatics, Tombs, etc. These headings are listed at the beginning of the subject index, and cross-referenced to some extent. There is a useful list of international and national museum associations, with addresses.

There is, unfortunately, no indication of opening hours, or if prior arrangements have to be made for visits, but as a general survey of the places one might need to investigate, it is invaluable.

H. BELL

VICTORIA HISTORY OF THE COUNTIES OF ENGLAND. *A history of the county of Sussex.* Vol. 6, pt. 1. *Bramber Rape (southern part).* Edited by T. P. Hudson. Oxford, University Press for the Institute of Historical Research, 1980. xix + 307 pp., illus. £48.00.

Work on the Sussex volumes of the Victoria County History was resumed in 1971 after a lapse in research since 1953 and this book is the first result of the new initiative. Each of the earlier volumes had dealt with the area of one rape neatly dividing Sussex into six parts. The growth in the available source material and the much broader scope of local history which the VCH now aims to cover made it impossible to deal with the whole of a rape in a single book. The current work examines only the southern part of Bramber Rape including the sprawling seaside towns which stretch between Worthing and Shoreham, the South Downs, the Adur valley and a line of villages just north of the Downs.

Much attention is inevitably given to the 19th and 20th century development of the coast. Worthing, for example, grew from a hamlet in the 18th century to become the second largest town in Sussex at the present time. The recent development of the coast is shown to be part of a continuing trend which already began with the foundation of New Shoreham at the end of the 11th century. New Shoreham rapidly became an important port reaching the height of its medieval prosperity by about 1296 when there were 90 taxpayers. Later it suffered an economic decline, and in the mid-14th century a large part of the town was said to lie waste.

The original pattern of the streets of New Shoreham has been the subject of some speculation. It has been argued that the southern half of the town was washed away by the River Adur after the medieval period, but as Dr Hudson points out, it is an unusual coincidence that the erosion should have stopped short of, close to and parallel with the main street! He convincingly suggests that New Shoreham extended further north than had previously been thought, a conclusion which is important for any future excavation in the town.

There is much of value for archaeological research in this area of Sussex. For example, the intriguing possibility is suggested that oak fragments found in 1956 might have come from the important pre-Conquest church in Steyning. Documentary and fieldwork evidence for the contraction of the villages of Botolphs, Annington and Wyckham in the medieval period is also discussed. These

settlements, all in the Adur valley, indicate that there was a severe decline in the prosperity of the area, but the nearby town of Steyning seems to have been less affected. The village of Coombes also in the Adur valley, survived this decline only to be deserted in the 17th century.

A separate section on economic history which did not occur in the earlier volumes is included in the present book. This considers the evidence for the agriculture of the area. Arable farming was important in the medieval period and on the South Downs large flocks of sheep were grazed. Some of the manors also had access to distant woodland pastures in the Weald, which provided timber and pannage for pigs

This latest volume in the VCH series continues the careful and systematic coverage of the country. The range of sources consulted is impressive and the evidence is generally well presented, although there is some repetition of material. One unfortunate omission, however, is any reference in the discussion of Sompting and Old Shoreham churches to the standard work on Anglo-Saxon architecture by H. M. and J. Taylor. The book as a whole is an important contribution to the history of this part of Sussex and is likely to become itself a standard work.

MARK GARDINER

CLARE T. *Archaeological sites of Devon and Cornwall.* Ashbourne, Moorland Publishing, 1982. 160 pp., illus. £7.50 hardback; £4.95 paperback.

This book is a companion volume to *Archaeological sites of the Lake District* by the same author, published in 1981, and follows much the same layout. However, the complexity of many of the West Country sites and the geography of the region has caused the present volume to be arranged on a county basis and the sites to be described in broadly chronological order, from west to east.

After a brief introduction, which stresses the need for study of total landscapes, the various types of site are described: megalithic tombs, circles and burial mounds, settlements and hillforts, castles and fortified buildings, Christian sites and inscribed stones. There then follows the description of selected sites from each class. Most of the sites chosen are easily accessible, many of them are in guardianship and nearly all are well known. Starting in the extreme south-west, there is an emphasis on prehistoric sites in West Penwith, as is to be expected, though the rich early Christian remains of the region are given scant treatment. Over half the sites are in Cornwall, concentrated in West Penwith and in east Cornwall but with two major coastal sites (Trevelgue and Tintagel) also described in some detail. Moving across the Tamar into Devon, the number of sites is fewer but they are all of prime importance and a relatively large amount of space is devoted to them. The plans and descriptions of the prehistoric sites on Dartmoor are particularly useful for those visiting the moorland regions.

The method of description by line drawing and minimal text is effective once one gets used to the system of lettering and numbering. In many cases the monuments are exhaustively treated and numerous illustrations with accompanying explanatory text serves to illuminate some sites which would otherwise be difficult to understand on the ground without a good site guide. The drawings are clear and for the most part quite pleasing, though an excess of stippling on some of the prehistoric stonework tends to confuse in certain cases.

The factual information given should, one trusts, be accurate, but the interpretation placed on these facts is sometimes in question. This reviewer can only judge in detail the site of Carn Euny, and here certain assumptions have been made which are neither stated nor implied in the published report, though the author appears to have consulted it. An example of such an assumption is that stones with hollows found in the floors of houses at this and other sites in the area were used as post supports. This is a traditional view, but one which as a result of excavation is now in question, since their use as querns is far more likely. At least two further misleading statements were made, one concerning the blocking of the Fogou, the other concerning findings from the excavations.

It would be churlish to deprecate such a useful little book on the evidence of one site, but one cannot help wondering how many misinterpretations of a like nature may have been made at other sites with which this reviewer is less familiar. In general this is a compact handbook useful for visiting selected sites in the south-west of Britain for, as the publishers announce, 'one can stand with the book in hand on all the sites and discern the major features through the eyes of a professional archaeologist'. Those wishing to pursue their interest any further, however, will be disappointed. A glossary and an index is provided, but the lack of any further reading list is a sad omission, since most of the sites selected are published and there is at least one excellent up-to-date general work on the region.

P. M. CHRISTIE

ROYAL COMMISSION ON HISTORICAL MONUMENTS (ENGLAND). *An inventory of historical monuments in the county of Northampton.* Vol. 1. *Archaeological sites in central Northamptonshire.* London, HMSO, 1979. lxv + 201 pp., 171 figs., 32 pls. £30.00.

This volume is the second archaeological inventory to be issued for Northamptonshire and covers the central part of the county including Corby, Kettering, Wellingborough and Castle Ashby. It is part of a set of five – North East (1975), North West (1981), South West (1982) and the City of Northampton (forthcoming). In conjunction with these, there is now a new and very welcome departure in the form of a set of maps (*Northamptonshire. An archaeological atlas,* RCHM Supplementary Series 2, 1980) that summarises the vast wealth of archaeological information contained within the volumes. When publication is completed, it will very likely be the case that Northamptonshire is the best documented and most thoroughly explored of English counties for its archaeological remains, particularly Medieval field monuments. That this is so is due mainly to the years of preparatory work by C. C. Taylor and his colleagues in the Royal Commission, but is also the outcome of the remarkable blossoming of archaeological fieldwork in the area by local units and societies in the last two decades. Northamptonshire, as reflected in the RCHM volumes, serves as an excellent example of the British tradition of field archaeology at its best.

In common with the other RCHM inventories, Central Northamptonshire has an introduction that seeks to illuminate salient aspects of the area. This not only helps to guide readers unfamiliar with the region (such as this reviewer), but also reflects to a certain extent the interests and approaches of the investigators who compiled the entries for each site. Much of the introduction is devoted to the Medieval period, with discussion of the positioning of villages in relation to Saxon and Roman settlements, desertion and shrinkage of villages, etc. That discussion is both interesting and stimulating as a piece of historical geography, but could have been filled out in two directions. Firstly, the lack of a historical perspective is keenly felt, since hardly any contemporary developments in the region's history are mentioned, and secondly, discussion of communications between villages and with the towns is not pursued to any great extent, despite the relevance of this subject to the study of deserted or shrunken settlements. In places there was a feeling that the discussion was mainly concerned with 'village typology' or 'earthwork typology' for their own sakes, without clear connection being made with the people who constructed and lived in them. Elsewhere, there seems to have been uncertainty as to what to include. Thus, on p. lvii, 'The post-medieval (deer) parks have not been described unless they are of particular interest'. Surely they, and other monuments treated in the same way, should *all* be described if within the Royal Commission's chronological remit?

The major area of criticism lies in the general scope of this volume and its companions. The RCHM decided to separate the Northamptonshire inventory into two – archaeological monuments and historic buildings. Consequently, only archaeological remains are considered in the present series of volumes. This is a satisfactory arrangement for the prehistoric and Roman periods, as comprehensive coverage is achieved, but for Saxon, Medieval and later periods it can be frustrating to read of earthworks and finds of archaeological material that are evidently associated with contemporary standing buildings without any information being given for those buildings. Thus shrunken village earthworks are described without reference to the surviving buildings, gardens are given without their houses and earthworks of watermills are indicated but not those still standing. Would not a different division of volumes along period lines have been more useful? The prehistoric and Roman material could have been collected into one or perhaps two volumes, and the later archaeological remains described together with the historic buildings in the traditional manner of RCHM inventories.

This apart, the volume cannot easily be faulted, and will surely become a standard reference to the area for many decades. Long may inventories of this sort continue, whether at the hands of the Royal Commission or, as may be the case, the new national archaeological agency.

ANTHONY KING

ROYAL COMMISSION ON THE ANCIENT AND HISTORICAL MONUMENTS OF SCOTLAND. *Argyll: an inventory of the monuments.* Vol. 4. *Iona.* Edinburgh, Royal Commission on the Ancient and Historical Monuments of Scotland, 1982. xvi + 296 pp., illus. £45.00.

Iona has always been a centre of attention since Columba landed there in about 563 and established what was to be one of the greatest monasteries of early medieval Europe. Since the Romantic discovery of Scotland and the Isles in the late 18th century that interest has been at best uninformed, at worst, lunatic. There have of course been exceptions such as Bishop Reeves's great edition of the life of Columba by his relative Adamnan, but the vibrations of the island have consistently interfered with critical faculties, so that the good has often been submerged by the ghostly. The past few years have seen the writing up and publication of excavations by Mark Redknap and myself, and the

work of John Barber is about to appear; this hard basis of fact is now joined by the full survey of the standing remains on the island by the Royal Commission, so that, for a time at least, the vibrations should be soundly damped.

The extent of the remains and their importance can be gauged from the fact that one whole volume of the Commission inventory has been needed to contain them in a far from luxurious format and with a far from indulgent commentary. The main monuments described, apart from a Bronze Age ring cairn and an Iron Age dun, comprise an early 12th century chapel in the graveyard, an early 13th century church (the nunnery) with later conventual buildings, and a 15th century abbey and conventual buildings enclosing earlier phases of construction. To these buildings have to be added the first detailed studies and illustrations of four major carved crosses of the 8th or 9th century, over 100 'early Christian' carved stones collected together and illustrated for the first time, a further 100 or so grave slabs of the later medieval period, and one post-medieval gravestone. For good measure attention is also given to the village, the parish church and manse, the marble quarry, and some shielings of doubtful date. The volume is rounded off with the first connected history of the island ever attempted.

Into the connected narrative the results of the various campaigns of excavation have been well integrated without ever going into archaeological detail. Some of Charles Thomas's work is summarised though this has not yet been written up for publication. I think the medieval writers of the volume would accept the description 'architectural historians', and would not be too upset if I disagree with some of their archaeological judgements. Minor disagreements result from the fact that they have not the space to argue out two differing views of the same thing, such as the use to which the lime burnt in the (?)7th century lime kiln was put. I suggested in my report that the lime was for an acid soil, they favour its use for mortar, but I still feel that the total absence of mortared construction of the right period helps my case.

The volume is profusely illustrated with at least one drawing or photograph on most pages, an excellent set of clear plans, and superb fold-out drawings of the complete abbey literally stone by stone. These detailed sections and elevations have been reproduced direct from the original pencil drawings which gives them a soft grey texture quite different from, and in my view far superior to, the hard black line of inked-in line drawings. There is, on section III (looking north) an interpretative sketch of the vital length of walling between the crossing tower and the sacristy door, but, since that section of wall is really the key to the whole building history of the church I would have liked a photograph of it to show the evidence as closely as possible without artistic intervention. I am not in any way questioning the interpretation given for I think it is quite correct, I am simply asking for one more piece of the basic evidence.

The other thing that I miss is a large detailed drawing of the N window of the sanctuary to compare with the interior and exterior drawings of the S window given on pp. 68–9. All we have for the N is a photograph on p. 74 and the small scale drawing on the full section of the N wall on pull-out III. The interpretative section on that drawing shows some of the tracery as restoration of 1874–1910, but this is not discussed in the text on p. 70. The reason for my interest is that I have tried to draw the tracery many times and failed miserably, I would say because it is not 'right'. I suspect that some of the tracery is misplaced, so that the central light does not in fact have an ogival cusp, but follows the plan of the S window. I was hoping, from a large accurate drawing, to cut out the stones on card and then to re-restore the window in my own way. These niggles serve to show how well the detailed evidence is presented, and how restrained the commentary has had to be.

Many of the general views taken inside the abbey, sometimes with natural light, sometimes with floodlights, show the building off to perfection, and it is quite clear that the people involved with the volume all fell in love with the place. The result is a triumphant combination of scholarship and art.

RICHARD REECE

HILL, David. *An atlas of Anglo-Saxon England.* Oxford, Blackwell, 1981. xii + 180 pp., illus. £16.00;

This book consists of 260 maps and tables which chart the history of Anglo-Saxon England. Most of the limits in the information come out of the simple description except for the elusive subtitle '700–1066' which does not appear on the title page, or the preface, the introduction, or even the cover, but is admitted on the inside of the dust-jacket. Archaeological evidence is admitted, but not very often, and when it does appear it sometimes fits oddly with the historical information. Even when England is divided up between nine maps the scale remains at 12 miles to the inch so that local topography can add little to the total. When these points have been listed the rest is simple praise for the amount of work which has gone into reducing the varied sources to a simple and well-drawn series of maps which are all designed with particular motives.

Maps 1–133 form a historical narrative in which kingdoms, wars, and especially the Vikings loom large. This is an accurate reflection of Anglo-Saxon concern in the present academic world and syllabus, so the atlas will be correspondingly useful. Maps 135–187 concern administration and here, inevitably, some information from before 700 creeps in, and post-Conquest sources form a vital part of the evidence. The maps for the economy, 188–236, are sometimes rather thin – the mills on map 197 might be taken as an example, whereas the last set of maps on the Church, 237–260, give an impression of much fuller cover.

Where so much information has been so economically compressed into so accessible a form there is obviously plenty of room for local niggles because the criteria adopted for managing the data cannot be expressed in detail. Thus the four royal roads of Anglo-Saxon England are the Foss Way, Watling Street, Ermine Street, and Icknield Way, and these are shown as continuous lines, in the case of the Foss Way, on the Roman alignment. Does this really mean that the section between Cirencester and Bath, now discontinuous, only broke down as a long distance unit after the Norman Conquest? In the same way the symbols on the maps for churches seem to exalt historical sources over the archaeological so that the complete and early church plan at Cirencester appears to be missing.

But if every history undergraduate absorbed this book the interest in archaeology and topography would grow enormously, and if every archaeologist absorbed it he would be furnished with what we know, and, more important, what needs to be known.

RICHARD REECE

PLATT, Colin. *The parish churches of medieval England.* London, Secker & Warburg, 1981. xvi + 185 pp., 138 illus. £15.00 hardback; £5.95 paperback.

Colin Platt's recent book is a 'social history of the parish church' from its Anglo-Saxon origins through to the upheaval of the Reformation. It is yet another good example of the author's ability to mix the scholarly and the popular and construct very readable social histories of the Middle Ages through the interpretation of archaeological and architectural evidence.

It is imperative that archaeologists and architectural historians involved with the study of medieval parish churches understand a good deal of the parish community and clergy, and the economic and social influences that shaped their lives. *The parish churches of medieval England* is a good introduction to this complex subject and in part caters for this need, although it is unclear exactly who the book is aimed at.

The content and its arrangement reflect a perennial problem in parish church studies: the division between the era of expansion in the church from the 11th to the 13th centuries and the age of abundant record-keeping in the later Middle Ages makes it difficult to tie together the documentary and architectural evidence.

The book's structure depends mainly on the presentation of the detailed documentary record, but tends to lack cohesion. Had some of the evidence been based around architectural/archaeological topics (e.g. nave, tower, churchyard, etc.), the account might have been a little clearer and of more value as a work of reference in the context of the growth in church archaeology. Two or three case studies, real or fictional, would perhaps have given the work more clarity and perspective.

The great value of this book lies in the breadth of treatment and in the numerous references to the complex influences which combined to determine the shape and size of our medieval parish churches. It underlines new trends and indicates the importance of relationships between church and settlement, church and burial ground, architecture and liturgy.

CHRISTOPHER KELLAND

SALWAY, Peter. *Roman Britain* (The Oxford History of Britain, Vol. 1A). Oxford, Clarendon Press, 1981. xx + 824 pp., 10 maps. £19.50.

Since it forms part of the Oxford History of England this will be a standard work for some time to come, and it is therefore likely that many of the students who come to the Institute over the next decade will have been reared on this book at school, and will regard it as a basic source-book. On matters of fact, especially historical fact, this may cause little harm and some good; on matters of inference I shall have to warn them always to go back to the primary sources and to read around the subject – a normal warning; on matters of basic philosophy of what Roman Britain is, and how it should be studied, I shall warn the students that warfare is rife.

There are a few mistakes – since Carausius died in 293 he could hardly bring his coinage into line with Diocletian's reformed coinage of 294 (p. 299). The cessation of supply of coinage to Britain in about 395–402 may be no more than a general cessation of minting in the western provinces; it cannot be used to imply the breaking or weakening of Roman links with Britain on its own (p. 425). These examples show that no reader will come to any very great factual harm.

Most of the disagreeable implications in the work come from what to me is too ready an acceptance of historical sources. Primary sources are always given priority over any other source of information (tombstones, p. 550, even though the problems are noted), and secondary sources, if historical, are usually accepted without criticism where they help the case being made (Gallic villas and villa owners pp. 278–80). In points like this the student ought in any case to think out for himself the implications of the claims being made, and the book is a useful summary of possibilities.

Once these good points have been accepted then the student must be urged to forget the whole approach and start again with an empirical study of the basic evidence. Perhaps all that I am saying here is that a textbook of Roman Britain is inevitably a backward looking compilation, a summary of what we know, whereas the course that I teach aims to find out what we do not know, and what we want to know, and how it may be achieved. I do not think that I am ready to write my counter-textbook, in fact I am not sure that such is a possibility. I think for the moment I would prefer a compilaton of primary archaeological sources, without historical sauce, a reader of Roman Britain, from which each student should write his own textbook.

RICHARD REECE

BREEZE, D. J. *The northern frontiers of Roman Britain.* London, Batsford, 1982. 188 pp., 41 figs., 19 pls. £9.95.

In his preface Dr Breeze writes 'These Roman frontiers did not stand in isolation. They were built in reaction to something – or rather someone: the native peoples of north Britain'. This sentence summarises much of the purpose of this book – to bring together an up to date appraisal of the work of the Roman army in north Britain with an account of the impact of that army on native life. It tackles similar problems to those in *Roman and native in North Britain,* ed. I. A. Richmond (Nelson, 1958) but represents an advance on that work not merely because of more than two decades of exploration and discovery in the area, but also because it is not written as a collection of separate studies (admirable though individual contributions may have been) but as one man's view of the overall picture. This makes for a more complete and coherent account, which gains considerably from having been composed by a scholar whose working life as an archaeologist has been spent almost wholly in the north. Dr Breeze's intimate knowledge of the geography and underlying geology of lowland Scotland enables him to insert telling comments such as that on the apparent absence of forts in the territory of the Novantae (p. 57) which may be an illusion created by the nature of a terrain unresponsive to aerial photography.

Dr Breeze does not assume prior knowledge of the subject (although intelligent interest is necessary) but begins with an outline of Rome's history as an expansionist power through to the conquest of Britain, followed by an account of the conquest and a description of the structure and size of the occupying army. In following chapters Roman historical accounts and the archaeological evidence are compared and contrasted for the northern native tribes; the Agricolan campaigns; the retreat from total conquest; Hadrian's Wall; the Antonine Wall; and then, in the seventh chapter entitled 'War and Peace', the reorganisations of the late 2nd and 3rd centuries and the reforms of the 4th century down to the end of Hadrian's Wall. The final chapter ('Roman and Barbarian') summarises what is known and what is conjectural and highlights the gaps in our knowledge which 'can only be solved, if at all, by further excavation'.

One of the positive values of this book for southern-based archaeologists is that it brings together the results of a great deal of research undertaken in the north within the last decade, that we were aware of but to which time and circumstances often denied access. The complete reappraisal of the Wall sequences, made largely though a re-interpretation of ceramic evidence, was brought to the attention of all interested parties in an earlier work written by Dr Breeze, and Dr Brian Dobson (*Hadrian's Wall,* 1976, Allen Lane, revised version 1978, Penguin Books). Now within a wider framework we are made to think hard about long accepted 'facts' and the paucity of evidence for them is explored. For this reviewer, apart from the bonus of gaining insight into the native side of things, the most interesting section is that on Agricola. The concept of glen-blocking forts as part of the Agricolan advance is challenged. Dr Breeze prefers to see these forts and Inchtuthill as bases for advance in a post-Agricolan context, rather than as defences against the Caledonians during his campaigns. The towers on the Gask Ridge and those between Ardoch and Kaims Castle are placed in context

as a line of control (the Gask Frontier) belonging to a phase after the prospect of advance had been abandoned with the withdrawal of *legio II Adiutrix* from Britain. Parallels are drawn with a similar Domitianic system established in the Wetterau and Taunus regions in Germany (cf. D. J. Breeze and B. Dobson in *Glasgow Archaeological Journal*, 4, 1976: 130–1; for a contrary opinion see S. S. Frere in *Scottish Archaeological Forum*, 12, 1981: 89–97). Croy Hill and Bar Hill are removed from the list of slight remains of Agricola's Forth-Clyde line, but hope is held out for the possibility of further identifications and indeed a small new fort at Mollins has been confirmed as 1st century in date.

It is difficult to select further points for comment in a book that is packed with information and clear-sighted observations. Some illustrations may serve. The first arises from a comparison of Drs Breeze and Dobson's description of the original plan for the Antonine Wall system advanced in 1978, with that in the present book. In the earlier account 3–4 fortlets were noted between the six main forts with the observation that 'more may yet be found' (p. 92). New discoveries now make it possible to see a pattern of forts with *milefortlets* between – similar to that of Hadrian's Wall – with 'nine such fortlets known out of a possible original total of 29 or thereabouts'. Additional support for this may now be found in L. J. F. Keppie and J. J. Walker, *Britannia*, 12, 1981: 143–62, published after Dr Breeze's book had gone to press. Another important gain is the simple, but sensible explanation offered for the evidence of a military presence at sites on the Antonine Wall after the supposed withdrawal in the 160s. A fort may be occupied, as such, irrespective of its siting on a slighted wall. Castlecary, Mumrills and Kirkintilloch which have all produced possible post-Wall material may perhaps have been outposts, beyond the Tweed, of the new system based on Hadrian's Wall.

For Institute readers the inclusion of an up-dated version of Gordon Childe's distribution map of Iron Age monuments in North Britain (which was also used by John Gillam in *Roman and native in North Britain*) is a welcome reminder of the validity of his work of nearly a half century ago (*The Prehistory of Scotland*, 1935: 275, Map IV), but there is much that is new and in particular the discussion of brochs, duns and souterrains brings a clarifying light on to a very difficult subject.

There are no footnotes, but a helpful chapter by chapter bibliography at the end which should satisfy most readers who wish to explore details further. Of the line drawings probably the most useful are the maps, which among other things identify some of the sites less well known to non-workers in the field, and the distribution maps of key materials. It is good to have these collected between two covers. A book that is a must for students of soldiers or civilians (or both).

MARGARET M. ROXAN

MANNING, W. H. (ed.). *Report on the excavations at Usk 1965–76.* Vol. II. *The fortress excavations 1968–71.* Cardiff, University of Wales Press, 1981. viii + 233 pp., 46 pls., 96 figs. £15.95.

The full publication of Dr Manning's large-scale excavations at Usk will occupy several volumes, of which that under review is the most essential. It contains not only descriptions of the major structures but also sets the results into context. It is solely concerned with the fortress, which was occupied from *c.* 55 to *c.* 75 – later structures and finds are being dealt with in separate volumes. In addition to the defences, there are accounts of internal buildings including principally the larger and smaller granaries.

These are preceded by an assessment of the significance of the excavations for our understanding of the conquest of Wales. Earlier accounts of discoveries and research are evaluated, the native background explained, and the historical context of the Roman occupation of the site discussed in painstaking detail. Manning recognises the difficulties of defining a precise date for the fortress's occupation, favouring AD 52–3 to *c.* 74, and of identifying its garrison: *Legio* XX is preferred to *Legio* XIV, on grounds of probability. There is also a useful brief excursus on Usk's place in the network of forts – Manning's close acquaintance with local geography allows him to suggest that the location of the forts had been carefully designed to control the Silures. Chapter 6 deals (perhaps belatedly) with the site's physical setting. Its liability to flooding – surely a major reason why it was abandoned – is best demonstrated by a photograph (Pl. V) of the 1968 season. Throughout, it is clear that Manning has given much thought to the historical problems. If there is a weakness, it may stem from a natural wish to produce a tidy story from evidence which is still inadequate.

The excavations are reported in detail in Part II (Chapters 8–17). There can be no doubt that the policy adopted to strip large areas was necessary and correct, and one which renders the results more sound than those which might have been obtained by trenching. Investigation of the defences revealed a rampart of turf and earth and a single ditch except on the vulnerable south side which was provided with two. Measured over the ditch, the fortress covered an area of 48 acres, and Manning

is aware of the real possibilities of the use of standard lengths and areas – for instance, interval towers were clearly set 100 Roman feet apart. Also of value are the artist's reconstructions of the structures uncovered. There is perhaps too much duplication of Manning's previously published articles on comparative gateways and on granaries, while in the nature of the report the dating evidence is treated summarily. One might question the need to include the more detailed accounts of the excavation of individual areas, while some of the drawings are reproduced at an overgenerous scale.

The description of the roads excavated is of interest mainly for the contrast in the quality of build between different streets, presumably in anticipation of the amount of wear expected. This is the kind of detail needed for all such sites. The most important internal structures excavated were two sizes of granaries, the larger of which each measured 120 X 40 Roman feet. Their foundations were represented by rows of post-in-slot trenches, classic photographs of which (Pls XXXI–II) should be part of any manual on the excavation of military timber buildings. Manning has also thought carefully about the sequence of build, important in itself, though producing histograms of post diameters (Figs 54, 69) is rather going over the top – the mean size is clear without them. Why there should have been two types of granary is never adequately explained, and we obviously need further excavation to understand the exact nature of the site.

An Appendix on the coarse pottery type-series might well have been excluded with the full report imminent, as might the index of site feature references, although the general index and bibliography are both useful, and the plates certainly enhance the report.

In summary, this is a lavishly produced report, as good as any of its kind currently available. Text, drawings and photographs are all clearly written and printed, and while they are perhaps overgenerous in places, the price of the volume is still very reasonable. The reference and footnote system is rather unwieldy. Any criticisms, however, must be minor. The importance of the subject matter has been well served by the skill, time and patience which has obviously been spent on it by the author and his collaborators.

MICHAEL J. JONES

MANNING, W. H. (ed.). *Report on the excavation at Usk 1965–1976.* Vol. 3. *The coins* By George C. Boon. *Inscriptions and graffiti* by Mark Hassall. Cardiff, published on behalf of the Board of Celtic Studies of the University of Wales by the University of Wales Press, 1982. ix + 72 pp., 8 figs., 2 pls. £8.95.

In this slim, impeccably produced volume which contains only 72 printed pages and two plates the coins and inscribed evidence from the fort at Usk are set out in full. The detailed total comprises 429 coins, two inscriptions (or parts of them), and more than 53 graffiti. For good measure there is also a short summary of the four brick stamps and their place in the series belonging to the Second Legion. There is little to say about the brick stamps and the inscriptions for their publication is mainly a matter of putting them into print to help others in their work. The same is largely true of the graffiti, except for the mortarium waster which proclaims itself the pelveis of the contubernium of Messor, thus settling the earlier discussion of whether the word pelvis was ever used to refer to these grinding bowls.

In the catalogue of coins George Boon does allow himself an 'Excursus: Claudian Copies', but, true to the spare character of the volume, he delivers himself of all his thoughts in only three and a half printed sides. The highly important point that he makes depends on the dating of the samian pottery from the site to a period which can only start in *c.* AD 55. This he insists dates the issue and use of the very numerous copies of the regular coins of Claudius I (AD 41–54) to the years 55–70, a point which seems to me clearly and firmly demonstrated. When he attempts to draw deductions from the numbers of coins present at Usk he is always very careful to look elsewhere at comparative materials so that there is an idea of a background against which the finds at Usk can be interpreted: this greatly strengthens the arguments he constructs. Full details of each coin are given and an index relates each coin to its place in the archaeological phases of the site.

The only reservation I can find is rather philosophical and it in no way detracts from the excellence of the volume. The date of AD 55 which is quoted for the samian pottery is bound to be a fuzzy date, by which I mean a date liable to error by up to five or 10 years, for it presumably signifies 'between the conquest of AD 43 and the layers of burning dated to AD 60–61, but nearer the latter'. While the authors obviously know this there is no harm in emphasising it to try to scare off those historical vultures who descend on any dates ever printed in order to use them as firm evidence for their fables.

RICHARD REECE

WEDLAKE, W. J. *The excavation of the Shrine of Apollo at Nettleton, Wiltshire, 1956–1971* (Reports of the Research Committee of the Society of Antiquaries of London, no. 40). London, Society of Antiquaries of London, distributed by Thames and Hudson, 1982. xx + 267 pp., 113 figs., 48 pls. £30.00.

The remarkably well preserved temple which is the subject of this report is situated at Nettleton Scrubb in the valley of the Broadmead Brook, north of Bath. The place must have been as attractive in Roman times as it still is, and Apollo presided here, at first (at least by the 2nd century) from a circular building and later (3rd century) at an octagonal temple on an imposing octagonal podium. The architectural quality of this temple is very remarkable and suggests a large number of visitors. The dedications of few temples in southern Britain are known with certainty (though amongst them are Mercury's temple at Uley and Sulis Minerva's great sanctuary at Bath in the near vicinity), and it is thus very gratifying to have a votive altar which gives Apollo the Celtic epithet *Cunomaglos* ('Hound-Prince') as well as an ex-voto bronze plaque dedicated to Apollo (Frontispiece).

There were other buildings at Nettleton, one of them almost certainly an inn with a courtyard (building 11); another a rectangular hall, partially supported on piers, fronts the river (building 7). Here it is identified as *a schola* but Wedlake rightly cites the 'Long Building' at Lydney and the reviewer prefers to interpret it as an *abaton* for incubation, where the god could visit those afflicted in body or mind in their sleep. Wedlake actually posits such a use for the side chambers in the octagonal temple itself.

The 4th century saw modifications to the temple and the blocking of alternate side-chapels (at least at ground level) to create a cruciform building. It is suggested that the building may have been used as a church, but the evidence is hardly conclusive. In any case the building reverted to pagan use before the end of the century, although this last phase of the temple was exceedingly makeshift.

Around the temple the settlement may have grown up in the first instance as a result of the popularity of the shrine as a place of pilgrimage, but in the 4th century there are signs that it had become an industrial village. Pewter was certainly manufacturerd there. Nearby, on the brook, the masonry remains of a watermill almost certainly of Roman date was found.

Richard Reece demonstrates that the coin series from Nettleton continues to the very end of the 4th century. Skeletons with traces of sword-cuts and decapitations may hint at Irish raids (as Wedlake suggests) but they could equally belong to a period of lawlessness and feuding in the countryside (before the battle *Mons Badonicus*?). It is not possible to do more than speculate.

An earlier excavation by W. C. Priestly is briefly discussed. He discovered a relief portraying Diana, perhaps associated with the retaining wall of the site rather than a temple. However, a relief of Mercury with Rosmerta and a bronze candlestick in the form of a cockerel are surely very significant. A terracotta cockerel was found elsewhere in the settlement, and the bird is of course associated with Mercury, not Apollo as stated on page 54. A temple of Mercury would not be unlikely in the area of the settlement whether or not it was in Building 1.

The report is very old-fashioned in conception. No account has been taken of environmental evidence, and the photos and plans suggest that Wedlake's aim was to attain the broad shape of the story of Nettleton without too much concern for minutiae. In this he follows in the tradition of his mentor, Sir Mortimer Wheeler. The difficulty in that approach is that fine detail may often contain essential clues leading the sensitive student to revisions in interpretation. It is to be hoped that the physical condition of the temple of Apollo remains good and that eventually the site may be laid out to public view. At that time it might be possible to carry out limited excavation with the aim of establishing the chronology more closely, just as it is at present being done at Wheeler's own site, the Temple of Nodens at Lydney.

There are a large number of interesting photographs of details of the structure but the only panoramic view of the shrine is a very disappointing composite photo. The specialist reports are useful; Professor Toynbee's on the art objects (not as numerous as those from the temple of Mercury at Uley) gave me most pleasure.

MARTIN HENIG

BARKER, Graeme and HODGES, Richard (eds.). *Archaeology and Italian society, prehistoric Roman and medieval studies* (Papers in Italian Archaeology 2) (BAR Int. Ser. 102). Oxford, British Archaeological Reports, 1981. 342 pp., illus. £14.00.

This volume has something for everyone from the prehistorian to the post-Medieval archaeologist. It suffers occasionally, as do many symposium volumes, from too little written on too much. This criticism apart, it does produce a wide-ranging and valuable summary of recent research on the

social and economic aspects of ancient Italian society. There are, also, few contributions from Italians which reflects the volume's focus on such studies, rather than on objects, typologies, and architecture, subjects highly favoured by many Italian archaeologists.

Barker and Hodges have divided the papers into the following categories: 'artifact analysis: social and economic reconstruction', 'site and settlement interpretation', and 'regional and landscape studies'. Objects are considered, but for their value in the understanding of such aspects as Neolithic and Chalcolithic trade and trade routes (Barfield), the contents of amphorae (Rothschild–Boros), and Medieval and post-Medieval pottery production in north-west Italy (Blake).

Information from excavations and surveys is used for social and economic studies of, for example, Latium, Frattesina, and Sicily (Bietti–Sestieri), and Luni (Ward–Perkins). Larger areas are also discussed, together with the problems of interpretation and of conducting the surveys (for example in the articles by R. Whitehouse and by Small). The last section is devoted to surveys of considerably larger areas, such as Calabria (Ammerman), the Liri valley (Wightman), the Orco valley (Fedele), and the Molise (by Lloyd and Barker and by Hodges and Wickham).

Much of the research described is in its initial stages, with only the preliminary results being given. The new approaches to archaeology in Italy and the discussion of the problems involved make interesting reading and give a glimpse of the wider treatment of objects and of sites that is coming.

P. GREENWOOD

HOOD, Sinclair. *Excavations in Chios 1938–1955. Prehistoric Emporio and Ayio Gala.* Vols. I and II (British School of Archaeology at Athens, Supplementary vols. 15 and 16). London, Thames and Hudson, 1981–2. xxi + 730 pp., 307 figs., 144 pls. £70.00, £62.50.

These two volumes contain the long awaited report on the prehistory of the island of Chios as revealed by a sounding in a cave site, Ayio Gala conducted by Miss Edith Eccles in 1938 and a number of trenches dug by Sinclair Hood at Emporio in 1953–5. The restricted nature of the excavations did not result in the discovery of significant additions to our knowledge of Early Bronze Age architecture or burial customs, but this is compensated for by a fine pottery sequence, clearly stratified and recorded in these two volumes in considerable detail.

Divided into 10 successive periods, Emporio V–I spans the range of Troy I and II, whereas Emporio X–VI, as well as the material from Ay. Gala preceded this better-known material and is thus of considerable importance, as the pre-Troy I Kumtepe sequence is very badly known in the Troad and the rest of lowland western Anatolia, and only a little better from Poliochni on Lemnos and Tigani on Samos. This new sequence is probably the most important contribution made by the Chios excavations, though the material contemporary with Troy I–II, but by no means identical, adds a southern version to the rather unimaginative Trojan ceramic repertoire. The Emporio potters, like those of Yortan, had a keener sense for decoration, right up to the end of the Troy II period. They scorned the wheel-made wares that characterise Troy II from the beginning, and appear not to have produced such wares, although they imported some in the last phase (Emporio I). This is a point of considerable interest and puts Emporio in the ranks of the majority of west Anatolian sites (Yortan, Poliochni, Beycesultan, Beycesultan) who kept up the hand-made Troy I tradition throughout all or most of Troy II, changing to the wheel-made wares only in the last phase of Troy II or even later in Troy III.

As the internal chronology of Anatolia – in the absence of sequences of radiocarbon dates – depends on ceramic comparisons the appearance of wheel-made pottery in early Troy II and Tarsus EB3a has been taken as significant synchronism, whose validity has been assumed to be valid throughout the area. Its chief defender is M. Mellink 'Anatolian chronology' in *COWA*, 1965) who also equates Tarsus EB3a with the Agade period of Mesopotamia, thus adding powerful support for a low date *c.* 2300 BC for the beginning of Troy II, a view also held by S. Hood (p. 90) where it is put *c.* 2200–2000 BC (without comment in the text). Her views agree with the German school of Anatolian and Aegean archaeology (K. Bittel, W. Orthmann, P. Spanos, P. Calmeyer, V. Milojčić, etc.). In *Die Hethiter* (1976: 306) Bittel places the destruction of Troy II *c.* 2200 BC and equates it with the end of Beycesultan VIII. How this phase with its Troy IV parallels can be contemporary with Troy II is not explained. It seems to me that in these arguments we are suffering from a number of old ideas: the assumption of orderly conformity; wheel-made wares follow hand-made wares; hence the latter are always earlier (they coexist in Troy II!); second, the assumption that Troy is *the* key site for western Anatolia (a key site perhaps, but not the only one!) and, third, that as the use of the wheel is attested earlier in the Levant and Mesopotamia, technical innovations must have come from the east, plus the assumption that the new fashion is bound to have spread like wildfire. What this theory ignores is the fact that many societies are innately conservative; they may not appreciate the technological superiority of making pots cheap, quick and nasty. The EB2 repertoire of much west Anatolian

pottery contains many shapes that would not benefit from being thrown on a wheel – the numerous spouts, handles, knobs, lugs, warts, feet are typical of the old hand-made craft. When the wheel really comes into its own most of these individual features disappeared and with it all styles of decoration – artistically the wheel was a disaster. Most Anatolians obviously thought so, *idem.* the Cretans, and the people of the Cyclades and the Greek mainland, having had a taste of it during the short-lived and Anatolian Levkandi phase.

Adopting the rule, wheel-made wares denote the Troy II (and later periods), hand-made ones Troy I (and earlier), leads to a nonsense chronology as simple as those early ones which saw red wares as always later than black wares, the latter being interpreted as the result of technological progress! The fallacy of regarding such arguments, though they may be perfectly true in any given situation, *as a rule* is easily exploded; at Neolithic Çatal Hüyük the sequence is: buff and light grey, or buff with a red wash, then black or brown with some red, later less black and brown, much mottled, and more buff and red. Not quite as expected on theoretical grounds.

The attempt to bring the wheel-made Troy II wares into the Mesopotamia fold would confine Yortan, Beycesultan XVI–XIIIa, Karataş I–V, Poliochni (before the Yellow phase) and Emporio V–II and Tarsus EB2 to Troy I, in a neat and regular pattern without exceptions. In his study of the Yortan cemetery, T. Kiamil does not agree, neither do I, for Beycesultan, B. Brea for Poliochni, nor S. Hood for Emporio, not to mention other studies as those of D. French or D. Easton. The basis for the disagreement is simply that the stratigraphical record from all these sites does not – on the evidence of ceramic comparisons – fit into such a simplified scheme. As S. Hood's study of Emporio, where every pottery shape is documented throughout the Aegean, shows, shapes and forms of decorations vary from place to place. In other words, no one site stands out as having a standard sequence which sets the tone for all the others; to bombard the relatively small and remote site into such a role is arbitrary, not to say capricious; to expect Karataş in central Lycia, e.g. to be more like Troy than like Beycesultan or Aphrodisias, both geographically nearer, is neither logical nor inherently likely and needs to be demonstrated before its validity is assumed. When Yortan, Thermi or Poliochni, much nearer Troy, show marked differences, and Emporio, Heraion, Aphrodisias and Beycesultan, further south, show more, one can hardly take the Trojan sequence as the arbiter for judging the material from Karataş, Kara Hüyük-Konya or Tarsus. It may be fashionable, but there is no known justification for it; the argument advanced that we are dealing with coastal and inland zones breaks down altogether. Though Beycesultan and Yortan – in my view long resistant to wheel-made wares – are inland; Emporio and Poliochni, hardly less resistant are in the coastal zone. Karataş and Aphrodisias, supposed early in the use of wheel-made wares, according to this theory, can hardly be described as being anywhere near the coast!

The alternative then is fairly obvious; one must abandon the attempt to force west Anatolian sites into a Trojan straitjacket – just as the Bogazköy sequence must not be used as a yardstick for the rest of Anatolia in the second millennium. The simple fact that these sites have good stratigraphies is of course acknowledged; what is not obvious is the range over which conformity with their sequences extends, or may be assumed to extend. As K. Bittel once observed to me long ago, we ought to have a site excavated every 100 km or so to judge the range of its influence. Some 20 years ago I produced a tentative map (*Beycesultan,* I: map V, 195) of south-western Anatolia on the basis of survey material with about eight subprovinces. Beycesultan and Kusura lie in two of these, the subsequently excavated sites of Karataş and Aphrodisias are both in different ones and the material now coming from Kuruçay Hüyük is again different. The concept of type sites for large areas is probably another of these fallacies in which theoretical archaeology abounds.

The process of ceramic comparisons – still our best guide to chronology – is only valid if we take one step at the time and try to avoid giant leaps, like that from Akkad to Tarsus, Tarsus to Karataş and from Karataş to Troy. As Renfrew has pointed out the comparisons between Troy and the Greek mainland – non stop – may have led to the same chronological incongruities.

This subject raised at some length here remains the stumbling block to the entire interpretation of the EBA cultural development of Anatolia – a point of fundamental importance in an age when Anatolia was probably the chief supplier of metals to Mesopotamia and Syria. On the low chronology of M. Mellink and our German colleagues, the Anatolian metallurgical achievement of Troy, Alaca Höyük or Horoztepe are late Accadian – Ur III in Mesopotamia terms; and they would look like a backward lot. On my chronology the links are with ED III B–Ur III, spanning not three but some six centuries before 2000 BC which would remove the stigma of Anatolian backwardness.

Where such cultural correlations and appreciations are involved, the establishment of a watertight chronology is essential and not a luxury. When new facts come to light they should not be ignored or 'adapted' so as not to interfere with accepted theory or wisdom, as if the latter were sacrosanct. The chronological problems of the third millennium in Anatolia could have been solved by now if more excavators had paid attention to the need for radiocarbon dating. Emporio has nothing to contribute; one single date for period IV, archaeologically the equivalent of mid-Troy I (p. 273 2025–92 BC, MASCA 2580–92 BC) is insufficient evidence (see D. Easton in *AS,* **XVIII**, 1976: 145).

Emporio X–VI, the pre-Troy sequence, present us with the largest body of material so far published from the eastern Aegean, both on offshore islands and on the west Anatolian coast. The length of this period and its correlations again present problems of no mean order. The excavator argues for a considerable time range spanning the huge stretch from Early (pottery) Neolithic to Late Neolithic in Greece and the corresponding Çatal Hüyük, Hacilar and Beycesultan Late Chalcolithic period. To the reviewer, however, this seems most unlikely, and neither the depth of deposits encountered nor the parallels drawn (some of which are extremely far-fetched) seem to warrant such a conclusion.

It has long been recognised that Troy I did not mark the beginning of the Early Bronze Age and M. Mellink's suggestion to call Kumtepe IB 'EB 1' has always made good sense. Into this horizon Emporior VII–VI, upper levels of Ayio Gala, upper deposits of Tigani in Samos and perhaps Poliochni I ('black') fit fairly comfortably. Their equivalent at Beycesultan is probably not Late Chalcolithic 4, but EB 1 (levels XIX–XVII). All these assemblages share a number of shapes of which the carinated and rollrimmed bowls are the most characteristic, though methods of decoration may vary.

At Emporio it is white-painted black ware, at Poliochni I ribbed and fluted ware, at Beycesultan thin fluted black, red, orange and buff burnished ware; there the white-painted juglets were popular during the preceding and very long Late Chalcolithic phase, with which S. Hood links them.

The earliest three periods, Emporio X–VIII, are probably the most interesting of the whole sequence as they sport a variety of wares, almost unknown in Anatolia. One suspects a link with the pattern burnished ware of Beşiktepe in the Troad into which H. Schliemann dug a hole a century ago and the remaining sherds of the site were likened by W. Lamb to similar looking pottery from Tigani in Samos. At Emporio this red brown material appears typical for period VIII, and may start in IX. Nothing similar is known further inland at Beycesultan. But at Emporio it is also accompanied by incision without white fill, so far unmatched elsewhere. Periods IX and X, however, have dark burnished wares, with a predilection for horned handles in X, some of which also occur in the Saliagos culture, which S. Hood equates with this period. This I doubt; in my view the Saliagos group probably preceded Emporio X, though overlaps can never be ruled out. Nor am I happy about his equation of the Ayio Gala (lower) material with Emporio VIII and IX; it lacks the pattern burnish, the incision, the horned handles, etc. Why should it not represent a considerably earlier phase? Until some better evidence is presented I feel that Emporio X–VIII (and early Tigani) span but a small part of the long Beycesultan XL–XX, Late Chalcolithic, probably phase 4 and perhaps phase 3. Phases 1–2 are probably covered by the Saliagos culture – itself linked with the mainland Greek Middle Neolithic. Emporio X–VIII I therefore regard as contemporary with the Greek Late Neolithic, and it is only the Ayio Gala lower group somehow related to the Hacilar complex that would seem to fit still in the Greek Early Neolithic, perhaps towards its end.

Interpretations apart, the publication of this important material is greatly welcome. Chios' central position (like that of Samos) now provides us with a sequence with its territorial base probably in prehistoric Lydia opposite the islands, a halfway house between the sites in the north-west and those in the south-west, and at the same time a base for contact with the Cyclades and the Greek mainland. As a bridging site, its commercial role may have been considerable – and though the excavations produced little evidence for it, its richly decorated pottery easily outshines that of Troy or Thermi whose potters seem to have been less gifted.

This is a 'key publication' for specialists on Anatolian pottery – it contains no lightweight 'models' or attempts at 'explanation' in socio-economic or any other terms. No flights of fancy but a solid base of archaeological evidence. The only complaint is its cost; £132.50 very effectively confines the book to archaeological libraries and a few lucky reviewers.

JAMES MELLAART

HODDINOTT, R. F. *The Thracians* (Ancient Peoples and Places 98). London, Thames and Hudson, 1981. 192 pp., 168 illus. £12.00.

Hoddinott has already produced an excellent guide to Roman sites in *Bulgaria in Antiquity* (review *JRS*, **LXVII**, 1977: 236–8). In this book Hoddinott takes on the still more formidable task of examining the prehistory of 'the Thracians' from the Chalcolithic through the Bronze Age down to the Roman period. Such a vast chronological scheme is equally matched by the wide geographical limits set to the study, extending from the Crimea to Thessaly and from Czechoslovakia to western Turkey. However, the very title of the book implies, and Hoddinott affirms (p. 14), that the region retained a fundamental homogeneity of 'culture' which is certainly not true of the Late Hellenistic period and which, from the evidence, appears to have been equally untrue of the region during the Bronze Age and Early Iron Age.

Disconcerting, is the title of chapter two, 'Thracian ethnogenesis', introducing the discussion of the Early Bronze Age. The Thracians can only be historically and linguistically identified towards the end of the second millennium BC and it is surely rash to assume that there is any historical connection with the population of the region as early as the fourth millennium BC. More serious is the application of the term 'North Thracians' to the Geto-Dacian tribes of Muntenia and Transylvania (5th century BC to the 2nd century AD) when linguistically, culturally and politically the Thracians (called here South Thracians) are clearly to be distinguished from their northern neighbours (cf. V. Georgiev, *Trakite i tehniyat ezik*, Sofia, 1977). Within South-eastern Europe there are considerable variations in topography, climate and resources which profoundly affected – and partly explain – this lack of cultural unity. The steppes of southern Moldavia and the Dobrogea, the rich farmlands of Transylvania, the influence of the Stara Planina as a divide between the Mediterranean lands and central Europe as well as the role of the Danube, linking, not dividing, the North Bulgarian Plain and Muntenia, are some of the factors which, although not discussed by the author, are nevertheless relevant to the development of the entire region.

It would, however, be wrong to dismiss the book as ill-conceived. Well illustrated and with a useful bibliography, Hoddinott has provided his English speaking readership with a useful introduction to current thinking by our East European colleagues on the prehistory of this part of Europe, particularly valuable as few original contributions by East Europeans have been published in Britain. (See, however, *Proceedings* of the International Symposium on Ancient Bulgaria, Nottingham, forthcoming.) Particularly helpful are the descriptions of well-known finds, generally known only from museum catalogues: the context of the Vratza treasure is no less dramatic than the finds (p. 113 f.).

The concentration on the description of particular sites sometimes stresses the exceptional rather than the general. Although 'several forts' of the 5th to the 4th centuries BC are alluded to and one site, Chertigrad, is discussed (p. 130), field survey has identified many hundreds of such hillforts in the Stara Planina and Rhodope mountains of southern Thrace; Chertigrad is only exceptional in that it has been excavated. A plan of Seuthopolis would have better illustrated the Hellenistic influence on the layout of this remarkable site and Kabyle, a site of potentially equal importance for our understanding of Thracian 'towns' of the Hellenistic period, receives less attention than it deserves. The use of ancient literary sources in relating time to archaeological evidence is not always meaningfully applied.

However, even though the question posed by Hoddinott himself as to the origins of the Thracians (p. 9) is not truly answered, the remarkable body of material discussed and listed does provide a useful introduction for the specialist and an interesting book for the student. Hoddinott is to be congratulated both for his energy and for his daring.

A. G. POULTER

TWOHIG, Elizabeth Shee. *The megalithic art of western Europe.* Oxford, Clarendon Press, 1981. xii + 259 pp., 290 figs., 47 pls., 15 maps, 13 tables. £50.00.

Here is the long awaited survey by the doyenne of western European megalithic art. Dr Shee Twohig herein discusses the art carved and sometimes daubed on the megalithic monuments in Iberia, Brittany, the Paris Basin, Ireland and Great Britain. For each region she reviews the motifs, techniques of manufacture and chronology of the art and to a small extent the stone architecture on which it is found, pointing out similarities and differences within and without the regions. The associated archaeological findings are noted and previous work and theories on the topic are assessed. The information for each individual site is gazetteered and all this is illustrated by drawings and some carefully selected black and white photographs.

Shee Twohig's comments and usages are mostly uncontroversial. She chooses to retain the conventional English designations 'passage grave' and 'gallery grave', even though many of us who are fairly familiar with the monuments on the ground find these terms confusing on the page. This might have afforded a good opportunity to establish a standard usage of the less confusing (and quite well known) French equivalents 'dolmen' and 'allée couverte'. 'Hypogée', incidentally, is used instead of 'rock-cut tomb' or, even, 'hypogeum'.

While the retention of conventional terms for the art motifs is satisfactorily explained, their suggested denotations are not always clearly demonstrated. For instance, the so-called 'buckler' motif is several times given an anthropomorphic explanation with, it should be acknowledged, corroborative examples, analogues and references, but the reading of the text and figures of this book alone would not in itself be sufficient to convince the sceptical newcomer on this point. It is important when reading a standard work not to have to accept matters on faith, especially as others – particularly, Breuil – are here criticised for not demonstrating their theses properly.

Further, while Shee Twohig seems to accept that the 'breasts and necklaces' design denotes just that, she creates some confusion with '. . . when necklaces occur in Breton gallery graves they are invariably found below the breasts, never above them, as if their significance was not apparent to the carvers' (p. 80). If the carvers did not know the significance of their art, we never shall.

An extremely useful feature of the book are the 13 'discussion figures', which very economically illustrate all the motifs under discussion. However, an opportunity was lost, when particular motifs and sites are mentioned in the Discussion, not to include in the generous margins the reference numbers to the 277 figures in the catalogue. At £50 per copy the student will probably not wish to rectify this omission with his own pencil!

Elizabeth Shee Twohig and her publishers are to be thanked for making available such an invaluable work.

ALEX HOOPER

CHAPMAN, John. *The Vinča culture of South-East Europe: studies in chronology, economy and society* (BAR Int. Ser. 117), 2 vols. Oxford, British Archaeological Reports, 1981. 512 pp., 169 figs., 37 tables, 1 map. £18.00.

Any book which contributes to the better understanding of the unique Vinča culture of south-east Europe is very welcome. This is even more true when the new study combines the results of 80 years' of excavation, research and interpretation and tries also to explore aspects of the Vinča culture which until now have received little attention. The two volumes of John Chapman's book (Vol. I, text; Vol. II, figures) which are a short and revised edition of his PhD thesis, show the familiarity of the author with the many and diverse material remains of the Vinča culture and the complexity of the neolithic sequence in south-east Europe.

In the first part of the first volume Chapman deals with the problem of chronology, arguing that the type-site of the Vinča culture cannot be accepted as representative of the total length of the culture since the changes in its material remains vary in a series of interlinked regions either in rate or direction. It is clear that such an approach minimizes the significance of radiocarbon dating and calibration which has until recently been very controversial as far as cultural change is concerned. The author is correct to enlarge the chronological debate to include a discussion of the processes involved in the cultural development of the area such as diffusion and differentiation, thus touching on the problem of the origin of the Vinča culture. For this important question Chapman has introduced as a working framework a study of the regional settlement patterns of the different Vinča phases within which the continuity of occupation (stratigraphy), local evolution and diffusion evidence can be documented (typology). It is difficult, however, to understand how Chapman's approach can be seen as a real alternative to the accepted typological approach in its wider sense.

In the second part selective aspects of the economy and the social organisation of the Vinča culture are discussed, such as population, settlement, environment and technology. It is basically a synthesis and discussion of the available excavational data. The author deals thoroughly with the important issues of population and settlement which were undoubtedly the determining factors of the Vinča culture; he also discusses the remarkable aspect of the ritual life of the culture in relation to other essential functions such as farming and social stability. Also interesting is the section about the short and long distance transhumance in south-eastern Europe (section 7.5.3) together with the hypothesis that pastoralism was widely practised in the Balkan Neolithic period.

All in all Chapman has succeeded with the help of well-prepared distribution maps in contributing a great deal towards the clarification of some of the problems presented by the Vinča culture.

NIKOS EFSTRATIOU

PHILLIPS, Patricia. *The middle neolithic in southern France: Chassen farming and culture process* (BAR Int. Ser. 142). Oxford, British Archaeological Reports, 1982. viii + 204 pp., 30 figs., 8 tables. £11.00.

Over half this volume consists of a summary catalogue of 137 major Middle Neolithic sites in southern France. This catalogue is an updated and revised version of the author's PhD dissertation (London University, 1971), each site entry including information on references, geology, location, excavation history, stratigraphy, features, subsistence economy, artefactual evidence, etc. The catalogue is a useful reference work since it brings together information from a wide range of dispersed

and often obscure publications, as well as the author's own observations, published and unpublished, on material she has studied in detail.

The commentary provides a review of Chasseen material culture, presented in terms of research history, settlement evidence, raw materials and exchange, resource exploitation, the culture historical view of the Chasseen, and radiocarbon dating and processual explanation. There are also a bibliography and index.

The commentary emphasises the range of new ideas and techniques that are being applied to studying prehistoric material culture in southern France, and particularly to the Middle Neolithic. These include analysis of raw materials (sources and distribution for flint, obsidian, hard stone, potting clays and inclusions, etc.), and technological studies (pottery production, uses of pit hearths, etc.). Unfortunately these new techniques are being applied in piecemeal fashion, rather than as part of new regional research designs. Most research, including the author's (cf. 'the Chasseen cultural package', p. 56), continues to consider the Chasseen as a cultural block to be compared and contrasted with the preceding Cardial culture and later Chalcolithic culture.

Such approaches seem to me unsatisfactory in that they continue the culture historical approach which was based on the recognition and study of such cultural blocks and their transformation through time. A more useful approach would be to study, say, the development and organisation of farming communities in the area through time at a regional scale, dispensing with the cultural blocks as subjects of study in their own right, and looking more closely at the processes involved.

Detailed research of this type will be difficult to pursue until it is accepted as the basis for regional research design and data collection, since the culture historical perspective has produced, and continues to produce, strong biases in the database. As the author emphasises, the data, and hence the catalogue, derive mainly from cave sites. There are therefore great difficulties in analysing and interpreting the artefactual and economic data in socio-economic terms for a period when we can be fairly sure that the majority of the population lived in open settlements in the main arable areas.

NIGEL MILLS

HARRISON, Richard J. *The Beaker Folk: Copper Age archaeology in Western Europe* (Ancient Peoples and Places 97). London, Thames and Hudson, 1980. 176 pp., 105 illus. £12.00.

The Beaker Folk is a well-written and well-designed volume, which gives an up-to-date picture of the state of research in Beaker studies. The title is in some ways a misnomer, because Harrison rejects the idea of migrants or itinerant metalworkers carrying Beakers across Europe in his Introduction, and adopts the Shennan model that Beakers and associated artefacts were 'status kits', used by emerging elites and chiefs all over Europe. However, the applicability of the model in Britain and the 'Southern Province' is doubted in a later chapter (p. 69), and part of the Conclusion is devoted to potential techniques for identification of skeletally or genetically coherent groups. Thus Beaker Folk creep back into the final argument.

Harrison deals with Beaker material in the Lower Rhine, Central Europe, Britain and Ireland, and the West Mediterranean, including North Africa. Sites and artefacts are described economically and clearly, and the editors have been at pains to insert the illustrations close to textual descriptions. There are 105 illustrations, both excellent photographs and good line drawings, including a useful series of distribution maps; the book cover claims 118 illustrations, one of the rare slips in this well-produced volume.

In the Introduction Harrison warns that he will quote other peoples' models, but not put forward any new ones of his own. This means that the majority of chapters are descriptive and that the possible mechanics of how the 'status kit' model might have worked are ignored, even for Iberia (it would be interesting to read Harrison's views on this in the future). It seems clear from the text that the 'status kit' argument applies best to Early Beaker contexts, while the later development of regional styles is associated with use of Beakers in a variety of local roles.

In Fig. 1, the Beaker findspots are said to 'coincide with fertile areas'; in many of the cases quoted by Harrison, the settlements are said to be in good agricultural areas, but a number of other environments have also produced Beaker settlement, such as parts of the Netherlands and East Anglia. In the same way, Beakers are found in south-east Spanish sites such as Los Millares, away from the more fertile areas. Harrison quotes Gilman's model (of difficult circumstances making investment in subsistence more necessary, and of the investment needing to be managed and protected) to account for the rise of elites in this area (p. 156). Harrison's generalisation is thus qualified by some of the evidence he presents.

This is a most useful book, dealing with a great deal of awkward evidence in a small compass, and pointing out many of the problems and inconsistencies of the data. It is to be recommended for both undergraduate and general readers.

PATRICIA PHILLIPS

COLES, J. M. & HARDING, A. F. *The Bronze Age in Europe: an introduction to the prehistory of Europe c. 2000–700 BC.* London, Methuen, 1979. 581 pp., 190 figs., 24 pls. £18 hardback; £9.95 paperback.

The intention of this book is to provide a general survey and textbook of the European Bronze Age. The lack of a good textbook has long been considered a difficulty facing the student of this important but complex period of prehistory. The problems of writing such a book are the main reason why few attempts have been made to do so, and the authors are to be congratulated upon tackling these problems and producing a readable and authoritative introduction to the subject.

The book covers Europe from Ireland to European Russia, and from Scandinavia to the Mediterranean excluding the Aegean. Each author deals with the area best known to himself. The period is arbitrarily divided into an Early and a Late phase and these are dealt with in turn over the regions comprising the area mentioned. The introduction draws attention to the main problem areas to be considered: the implications of the introduction of metal; the complexity of cultural groupings; the interpretation of environmental evidence; anthropological questions; typological discussions and the use of metal analyses; and the vexed question of dating.

The main part of the book covers the archaeological material in 10 chapters each of which follows a similar, but unfortunately not always clearly defined, layout. This covers geography and environment, terminology and chronology, settlement and economy, burial and ritual, and material culture. The authors guide the reader through the enormous mass of evidence in a remarkably coherent fashion and there are pages of notes and a good bibliography which allow particular topics to be followed into the large body of literature which exists in a variety of languages. Each chapter has a selection of drawings and a list of radiocarbon dates.

As with any book there are criticisms to be made. The figures are probably the worst aspect of the book. In most cases these are taken from other sources and it is felt that illustrations produced for this book would have been better. Many are very poorly reproduced, a criticism of the printers and not of the authors. The value of certain figures as illustrations to the text is debatable; thus Fig. 120 comprises the plans of five hillforts, of which three are not mentioned in the text at all and two are not referred to in connection with their ground-plan. The maps used vary greatly in layout and content; Chapter 5 has no map for the larger part of France, whilst the maps of Spain (Fig. 70) and that of the Nordic area in a later chapter (Fig. 185) are very poor. Most of the tables are of radiocarbon dates and it is suggested that, since this is primarily a textbook, more tables giving comparative chronological sequences (e.g. Table 9) would have been useful.

It is only to be expected that the dual authorship of this volume would lead to inconsistency in the presentation of the evidence. There is often a marked bias on artefacts in certain chapters and on the environment and economy of others. This does produce an imbalance which makes it hard to relate evidence from one region with that from an adjacent region. Some chapters do 'avoid the proliferation of names of archaeological groups' (p. 3), but a glance at others shows that this is not always the case (e.g. pp. 339 and 401). It could, however, be argued that it would be unwise to attempt to write a textbook covering Central European prehistory without at least introducing the student to some of the many groups referred to in the literature.

There are statements in the book which could be queried (what does the author feel about the detection of ethnicity from the archaeological record? – cf. pp. 335, 336 and 367) and erros have crept in, such as the incorrect reference to Plate 19 on p. 348 – there is no plate of the Biskupin gateway. However, all these criticisms are comparatively minor points. It is hard to imagine how a single author could have covered the range of material adequately, and at last we have a reliable textbook which takes the student through the maze of evidence on the European Bronze Age. It will surely be a valuable book for some time to come and has done far more than 'clear the decks for further study'.

B. OLDHAM

WELLS, Peter S. *Culture contact and culture change: early Iron Age central Europe and the Mediterranean world* (New Studies in Archaeology). Cambridge, Cambridge University Press, 1980. xi + 171 pp., illus. £12.50.

There has been a spate of publications on the European Early Iron Age in the last few years. This volume by Peter Wells, in the New Studies in Archaeology series, is a source of information on two areas that figure prominently in the literature of this period: the Western Halstatt province in SW Germany and the Saarland of the Middle Rhine. Many archaeologists will appreciate this volume for that reason alone but the author is attempting to do more than this and puts forward a wide-ranging theoretical interpretation of the material. Since the author asks us explicitly (p. 143) to regard his work as a case study in the investigation of 'culture contact and change', this reviewer will assume the author has a more general purpose in mind and concentrate on the theoretical objectives of the work.

Phrases like 'culture and change' are the hallmark of a period (late 50s and 60s) when American sociology and cultural anthropology were charged to produce a theory that would guide policy makers in the developed world (i.e. the USA) in their quest to raise the undeveloped world to their own civilised standards. The result, Modernisation/Acculturation theory, contained the following assumptions. The modern developed world had emerged *sui generis* in the West and had a responsibility to help to transform a traditional undeveloped rest of the world into its own image. 'Traditional' societies would not 'evolve' to a higher level of complexity of their own accord because of a blockage of pre-modern values and beliefs and the conservatism of existing power holders. Social change would only come about via external contact with the developed world, as the source of innovations in technological skills, education, trained manpower and development aid. The success of such policies would depend on the creation of new elites in undeveloped countries that would have the incentive to break with tradition and ally themselves to the interests of the developed world. Conveniently, a rudimentary neo-evolutionism of the Leslie White/Julian Steward variety existed to legitimate these policies, thus the change from traditional to modern society was not only an inevitable evolutionary development (increasing energy capture, etc.) but had already occurred numerous times in world history.

I don't suppose the application of this paradigm to the European Early Iron Age is anything other than of academic interest. It is certainly of some interest to understand how modernisation theory entered archaeology through the influence of American neo-evolutionism on the New Archaeology but this cannot concern us here. But it does allow us to see why Wells tends to interpret the Central European Early Iron Age in the way that he does.

For instance, despite the comments on pp. 20–1 concerning the small find evidence for continuous interaction between Europe north and south of the Alps, pre-, during and post-Halstatt, the problem of the whole volume is framed in terms of contact between two autonomous entities. Moreover, prior to Late Halstatt times, the communities of West-Central Europe are characterised as self-sufficient with few 'commerical interactions' with outside areas (p. 83), production was localised, social differentiation limited and power uncentralised. All this changed after 600 BC due to Greek contacts which 'kicked off' a sequence of changes in Central Europe resulting in a sort of mirror image of the preceding state of affairs. Whilst preconditions for change existed in Central Europe, it could only be 'triggered off' by external contact with the Greeks. Hence the systems model which conveniently predicts externally guided, smooth, unfolding progress to a more complex state of affairs rather than messy, conflict-ridden social change in which devolution is perhaps a more certain long-term state of affairs. The mode of contact envisaged by Wells is that between elites (pp. 76–9). In Late Hallstatt, contact is initiated by the Greeks who 'create' Halstatt chiefs to further their trading interests. The latter are relatively passive agents who eagerly (human nature being what it is), seek Greek gifts to increase their 'prestige and power' at the expense of the rest of the populace. In the Saarland in Early La Tène, there are no chiefs so we are to envisage entrepreneurial competition with village headmen travelling to the Po Valley in search of prestige items. In both cases, 'chiefly rank' depends on external contacts rather than internal mechanisms of control; power becomes a free-floating resource dispensed by benevolent external trading partners. EIA chiefs are managerial redistributors on whom their populations depend for exotic luxury items and who owe their position to their 'leadership and organising abilities' (p. 98).

Probably, I could devote this review to empirical refutations of many of these arguments. But given that a previous publication in this *Bulletin* by Susan Frankenstein and myself, together with a longer unpublished version in the former's PhD thesis (Institute of Archaeology, London, 1977), were devoted to producing a diametrically opposed interpretation of much the same material, it would be fairer to spell out the contrasts and leave it to readers to decide on the relative empirical merits of the two schemes. In the joint publication, the authors employed a dependency theory model which stressed that Europe north and south of the Alps could not be studied as two autonomous units. The period of Greek and Etruscan directed trade represented a more intensive phase of interaction within a

single regional system in which no one 'society' was autonomous of any other. The development of Greek and Etruscan city states as 'cores' was a long-term tendency during the first half of the first millennium BC and depended on unequal exchange with various peripheral areas which intensified (from indirect to direct exchange) and shifted geographically from the Eastern Mediterranean to the Western Mediterranean and from South-East Europe to West-Central Europe during this period. Prior to any direct Greek and Etruscan 'contact', local societies in West-Central Europe reproduced themselves through exchange and the latter was embedded in local forms of alliance networks. Social hierarchy was a function of descent and alliance which in turn could be manipulated to the advantage of one group against others through differential access to exchange networks. Direct contact with new external trading partners was continually actively sought after as a means of acquiring short-term monopoly advantage. Hence, we emphasised in our work, the internal structure of Late Halstatt and Early La Tène societies and how this would both structure and be structured by their relations with the different social rationality of the city states. Moreover, a more active role was attributed to Late Hallstatt rulers in seeking exchange partners to further their political ambitions, of which Greeks and Etruscans would initially be only one among many, although perhaps with more critical long-term consequences due to the different rationalities of the social systems promoting monopoly advantage. Also, we argued that monopoly advantage in exchange would only be feasible for those communities located on the outer margins of expanding trade networks where competition would be least intense. The form of 'local society' was therefore directly influenced by the manner in which it became incorporated into the wider regional system.

The contrasts can be summed as follows. Whilst Wells stresses strong discontinuity between Early and Late Hallstatt due to Greek contacts, the alternative would stress qualitative social change only and a more significant continuity in basic social and economic principles. Wells emphasises elites and elite exchange, the other emphasises preceding exchange systems and the principles of order and competition in social hierarchies. Wells lays stress on local autonomy and comparison of isolated instances, the alternative would seek a larger unit of analysis within which change would have to be understood. A weak reconstructionist position on the past would argue that the differences matter less than the achievement of a unitary synthesis which would combine the variant findings of both approaches. However, this would do less than justice to two different views on social change and would not allow readers to decide for themselves the difference between scientific and idealogical theories. Peter Wells should be congratulated for presenting a sustained analysis within an explicit conceptual framework that permits debate and criticism and thus further our understanding of this critical period in European prehistory.

M. ROWLANDS

BOARDMAN, John. *The Greeks overseas, their early colonies and trade.* New and enlarged edition. London, Thames and Hudson, 1980. 288 pp., 319 illus., 6 maps. £12.00; £5.95 paperback.

The first edition of this study of cultural interaction was published in 1964; in time for this reviewer to make good use of it in his London University Institute of Archaeology course on the Iron Age. It was, indeed, refreshing to read of Vix and the Heuneburg in relation to other finds of Greek material elsewhere, and the entire volume was scanned from cover to cover with enthusiasm. Of course a great deal of new material has been discovered since then, and the author has packed the new version with facts and references. The result is less restful to read but the student will find it invaluable to use.

Although this survey is limited to the Archaic period, that was the time of the most profound Greek influence in the Mediterranean world. The establishment of colonies, especially in Sicily and *Magna Graecia* (i.e. South Italy), often made Greek culture dominant in certain areas. Etruria was very deeply influenced by Greece, especially in the artistic sphere. In the East, the older civilisations of Egypt and the Levant themselves influenced the Greeks who learned the techniques of the 'barbarians' and transformed their art into something utterly fresh in spirit.

Intelligent use is made of literary sources but Boardman very properly concentrates on pots (sensitive indicators of the foundation dates of Greek settlements) and above all on Greek art. As the author writes 'monuments and objects . . . are of no less documentary value for being considerable works of art. This is, after all, one of the many compensating factors in any archaeological study of ancient Greek affairs.'

MARTIN HENIG

POWELL, T. G. E. *The Celts.* London, Thames and Hudson, 1980. 232 pp., 137 figs., 12 pls. £8.50.

A book which is not really what it claims to be. The front cover states that it is a 'new edition' but it is a reissue of the 1958 text laid out in the new format of the Ancient Peoples and Places series and with new illustrations. The format makes it far easier to read and the illustrations are of a very high quality, although it seems unnecessary to repeat plates as figures (e.g. Plate VI and Fig. 85). The result is an attractive book, but there are doubts as to whether it should have been reissued in its original form.

When the original edition was reviewed in 1959 it was described as 'valuable . . . scholarly and up-to-date' (Fox, *Ant J*, **39**: 109–10) and 'concise . . . stimulating . . . pleasant to read' (Krämer, *Antiquity*, **33**: 229–30). Since the text is the same the comments of these reviewers remain relevant and may be consulted. In his introduction to the new edition Stuart Piggott suggests that the text has stood the test of time. Although this may be so for the linguistic and literary evidence used by Powell, it is clearly not so for the archaeology.

The archaeological review in the first chapter was produced at the latter end of the diffusionist era and few would concur with a number of the views expressed. It is not only outdated but is misleading to the general reader for whom the series is primarily produced. Equally, the last chapter on the 'Celtic survival' is not in line with recent research and publication.

Perhaps the biggest drawback to this edition is the lack of updating of the notes and bibliography. To allow the reader to assume that von Sacken (1868) is the basic work on Hallstatt (p. 59) and that he should ignore the last 24 years' work on *oppida* would not seem to be in line with the general editor's policy of presenting to the public the latest archaeological research.

Yet for all the criticism there still exists a nagging admiration for the book. It was a classic in its time and it is nice to see it available again. As long as it is realised that it is a reissued standard and not an up-to-date study it has its place. Viewed in this light it is still a readable book and the standard of production makes it a worthwhile book to have . . . for the coffee-table!

B. OLDHAM

CORNELL, Tim and MATTHEWS, John. *Atlas of the Roman world.* Oxford, Phaidon Press, 1982. 240 pp., illus. £17.50.

The importance of any atlas lies in its maps. I do not know of any comparable publication containing a clearer or more interesting range of cartographic material appertaining to Rome and its Empire. Topics range from the cultures of the Italian Bronze Age to the land reforms of the Gracchi and from the problems of Imperial defence to the distribution of the estates of endowed churches in Late Antiquity. The general maps are remarkably well drawn and include details of relief geography (so disappointingly omitted from Peter Levi's maps in Phaidon's companion *Atlas of the Greek world*). There is a good range of city plans as well. As an art historian, the reviewer regrets the absence of distribution maps of artistic schools (mosaics, sculpture, etc.) along the lines of those concerned with languages, but not only is it greedy to ask for everything, but it must be admitted that this would have been rather hard to do at the present state of knowledge. The excellent range of fine photographs with which the volume is provided and their well-composed captions fully exonerates the authors from any charge of philistinism.

There are inevitably a few criticisms of a book of this complexity. Although the authors are honest in admitting that their interests are biased towards early Rome (Tim Cornell) and Late Antiquity (John Matthews) this shows in the originality and depth of their writing; also we are much less well served by explanatory maps of the Roman world at the zenith of its power. Perhaps a third contributor was needed here. Extra space could have been found by omitting some of the rather banal double-page spreads in the book, for example those on town life in Pompeii, Portraiture and Everyday Life which do not rise far above the superficiality of articles in the Sunday colour supplements. The worst of these sections is probably that on the army with over-large, rather coarse drawings and a plan of a legionary fortress (Neuss) which does not even give the technical names (*praetorium, aedes, valetudinarium,* etc.) of the various buildings in the fort. This reviewer is certainly amongst those who believe that Roman archaeologists in general waste too much time on the Imperial Army and are not sufficiently concerned with religion, art and culture, but if something is worth doing it is worth doing well. The student needs to know more about Roman camps than this.

It is possible that such occasional faults are to be blamed on the publisher's original brief. Some of the material was evidently designed by the authors to appeal to an informed scholarly audience, but the coffee-table market was predominant in the publisher's office. Presumably it was

commercial – rather than the authors' own – inclinations which occasioned the bias towards the north and west of the Empire, with relatively more space being given to Britain (where little survives above ground, but where much of the readership lives) than to the far more important provinces of Asia Minor (merely holiday destinations for package tours) which are treated as no more than a single unit. Another criticism is the jarring use of American spelling and idioms which should not have been employed in a book written by British scholars and published in Oxford.

While the design of the volume is generally sensitive, some illustrations run across a double spread with the result that the impact of certain plates (such as that from the Vatican Vergil showing the death of Dido) is lost. Another irritating mannerism of the designer's (no doubt) is the occasional tinting of a monochrome photograph, with what intention is uncertain. (Such photos are described as 'black and white' on the dust-jacket!)

The reviewer found a few statements and emphases with which he disagreed. For instance, Hadrian's connection with Antinous was surely much more than a 'notorious relationship' (see p. 103) and may have indicated the Emperor's desire to shower favour on the East; John Matthews knows the career of Julian well but his achievements seem only grudgingly acknowledged here (p. 191). Had he lived it is possible that his dreadful forebear Constantine would have seemed much less important to us now and the second half of the book would have been longer and very different in character with the Empire and paganism alike triumphant over their enemies. But historians are right not to take up too much space over gambles which failed, and for all its splendour Julian's attempts to reform the world in which he lived came to nothing. Actual errors of fact are few, but note (p. 83) that there is no way in which the *male* gorgon of Bath can be the *goddess* Sulis Minerva (this is corrected on p. 139) and *Aelia Capitolina* was not primarily a legionary camp (p. 103) but a *colonia* (as stated on p. 162).

Despite all criticisms this is a book to acquire, read through and to use again and again. There are no footnotes, but the bibliography is more than usually helpful as a guide to the academic interests of the authors and as an aid to the student's own researches.

MARTIN HENIG

HIERNARD, J. *et al. Corpus des trésors monétaires antiques de la France.* Tom. 1. *Poitou-Charentes et Limousin.* Paris, Société de Numismatique, 1982. 130 pp., 10 maps. Fr. 140.00.

The first volume of every new corpus that is projected has to be examined with care and described honestly by each reviewer, for when the pattern is set there is little point in lamenting some fault that might have been corrected. In this case the idea of a complete new list of Gaulish and Roman coin hoards in France is excellent, the people who have assembled to work on the project are both knowledgable and thorough, the form and format are modest and practical, and the backing of the French Numismatic Society ensures that the work will be both finished and published.

The first series of hoards covers seven departments of France which each contribute between 15 and 35 hoards to the grand total. We can therefore expect the final count to be around 2,500 hoards. Unfortunately this will not mean a list of the coins in 2,500 hoards, for many of the hoards listed were imperfectly recorded, dispersed before being seen by any scholar, or known only from passing references. Where details are known they are given in summary form. Each entry, which has a number within each department (thus Loudun – a hoard of coins of Gallienus is no. 12 in Vienne) gives full bibliographical details, details, if any, of the site, and present whereabouts. Certain hoards are followed by doubtful hoards, hoards containing other material such as jewellery, and a very valuable list of isolated finds of gold coins. A set of maps of each department give the basic find-spots, and for each large Roman town the position of any hoards in relation to the defended area is included.

It is too early to draw any far-ranging conclusions from the information provided, but it is already clear how the records have been affected by the presence or absence of knowledgeable workers in each area; where there is no tradition of publishing local finds the numbers of hoards are remarkably low. This sort of bias may well be responsible for the small number of bronze hoards of the 4th century listed, for they may well have failed to interest even an able local expert. But, bias and all, a good start has been made and I look forward eagerly to the completion of a very worthwhile project.

RICHARD REECE

SEAR, F. B. *Roman architecture.* London, Batsford, 1982. 288 pp., 183 figs. £25.00; £9.95 paperback.

The emphasis of this book is on the architecture of Italy, indeed, mainly on that of Rome itself, though there is an excellent chapter on Pompeii and Ostia. The advantage of being selective in the way Sear chooses is that it leaves him room for particular attention to undeniably important buildings, notably, the imperial palaces on the Palatine and at Tivoli, where the potential of concrete was exploited to create a new architecture of interior space; and the Colosseum, on the construction of which Cozzo's valuable analysis is used to good effect. In his attention to building techniques, materials and architectural ornament he assimilates the results of numerous studies, e.g. those of Donald Strong. Sear has had the needs of students much in mind in making such matters accessible in greater depth and detail than is usual in a general work. His brief but clear discussion of the engineering principles of domes and vaults is especially useful. Nor does he neglect the historical and social contexts of architectural developments.

The final third of the book deals with the provinces and with late (in this context, post-Hadrianic) Roman architecture. Despite the statement that, after Augustus, 'Roman art had no fixed geographical centre', the Empire is placed decidedly second to Rome. The chapter on North Africa, where Sear has worked himself, is best. Spain flashes past in three pages, and the Balkans in one and a half, however. Selection is inevitable: however long the menu, one can eat only one dinner. But one might have had the fuller treatment which the riches of Asia Minor deserve if some of the less interesting Roman temples had been omitted, and some of the duplicate coverage in the chapters on Republican Rome and Building Types had been eliminated.

More generally, there is little about proportion as an aspect of Roman design. We are not told why the proportions of the Canopus arcade at Tivoli are 'unfortunate' whereas those of a similar arrangement at Ptolemais are 'correct'. One might have hoped for a more searching evaluation of Vitruvius, to whom so many pay lip-service. In this context, reference to Amy and Gros' recent study of the Maison Carrée at Nîmes might have been apposite. Some of the illustrations are too faint. Also, the book tends to move descriptively from building to building: often with illuminating insights, but it would have been helpful if the analytic strands had been drawn together with more deliberation. But it will be found a reliable, solidly based and useful book, with just the right number of notes to help further reading without overwhelming, and an excellent glossary.

Finally, a few points which a second edition might amend. MacDonald cannot have 'shown' what he claims for the Flavian palace when it is objected that 'one searches in vain for analogies' (p. 151); to say (p. 213) that 'traditional temples . . . continued to be built' in Gaul after the Roman conquest begs a big question about the architectural evolution of the Romano-Celtic temple; eliminate references to the plural of 'rostrum' as 'a Rostra'; and, since it is said that Apollodorus may have been the architect of Trajan's Baths (no ancient source), he should surely be mentioned as the architect of Trajan's Forum (as attested by Dio).

T. F. C. BLAGG

BRULET, Raymond (ed.). *Braives gallo romain* 1. *La zone centrale* (Publications d'Histoire de l'Art et d'Archéologie de l'Université Catholique de Louvain 26). Louvain-la-Neuve, Institut Supérieur d'Archéologie et d'Histoire de l'art, 1981. 222 pp., 80 figs., 4 plans. FB 900.

This is at once one of the most infuriating and interesting reports that I have read for some time. I invariably approve of papers and summaries written by Raymond Brulet and, by the time that I had finished, this one was no exception, but the initial stages were most off-putting. It is the first report on the work at the Roman settlement on the Cologne–Bavai road, near the village of Braives near the centre of Belgium. The first modern excavations took place in 1964 when a Late Roman defence was examined, and then there followed seasons of work from 1972 to 1980 on the defences and the nearby, and partly overlain, roadside settlement of the early Empire. The work was a joint project between the University of Louvain (Centre of National Archaeological Research) and the local Historical and Archaeological Society of Waremme from which both bodies seem to have benefited.

This first volume contains full and final reports on the trenches at the eastern end of the Roman settlement which are outside the later defences. Presumably future volumes will cover the late defences and the western trenches. Much of my earlier annoyance came from the lack of a clear statement of what the report contained, how the various bits fit together, and how the ancient and the modern features are linked. I know now, and advise other readers, that the key lies on p. 31, Fig. 12,

where all the trenches are marked; this should be compared with Fig. 2 remembering that the reference point 0 on Fig. 12 must be about where the 160 m contour cuts the main W–E road on Fig. 2. A summary of what the Roman features might mean is tucked away on p. 212, Fig. 80, remembering always that the one point of reference is that slight bend in the road.

Having got to this point of familiarity all is plain sailing, except to remember that the trench numbers on the pull-out plans at the end are in arabic numerals (7, 8) but when they occur in the provenances of finds in the catalogues they appear Roman (VII, VIII). While we are at this point of detail it is good to record that all the finds are referred back to the feature from which they come, and these are all marked on the plans at the end of the volume. Thus most of the 4th century coins come from B I 19, which is feature 19, probably the robbing pit to remove an earlier well, in trench I on site B. This was a large pit 4.50 m deep and about 6 m in diameter, but, as for most of the pits, there is no section given, nor layer numbers, so there is never any chance of telling whether the late material is an integral part of the filling of the pit or a part of a sag in its upper reaches. The lack of sections for sunken features is again annoying when the sunken features referred to as 'caves', and so presumably to be translated as cellars, are under consideration. These features vary from 1 to nearly 3 m in depth, from very small dimensions of 2 m square to the size of a reasonable room, are built of both wood and stone, with stairs or ramps down to them, and they seem to lie behind the street frontages. They therefore vary between good stone-built cellars of the type known in the east of Britain (Fig. 26, p. 61) and rather regular *grubenhäuse* (Fig. 27, p. 63). None of them seems to require a date after the general life of the settlement, so they presumably belong to the early 3rd century at the latest. In some cases these sunken features are set about 25 m from the road and there is then the chance that they have around them rather flimsy post-built structures only discernible as a number of unconnected post-holes.

The life of the early settlement seems to run from the early years AD to about the 270s when the defence was built and, so far as can be seen, the occupation outside the ditched enclosure ceases. Brulet several times suggests that occupation in the 'vicus' goes on because of the late coins, and the stamped Argonne ware, but since nearly all of this dating appears in the one late robbing feature, and in one or two other pits, I think all this late material belongs to rubbish disposal from inside the defence. The pottery is well drawn and described, with good fabric descriptions, discussion of the mortarium stamps, and the promise of closer dating, and discussion of the mortarium origins in later reports. This also needs to be taken up for the colour-coated fine pottery because I want to know how much belongs to the Moselle and how much to the Argonne. The animal bone report is very welcome, but highly surprising, for beef predominates and there may be no sheep at all. Part of a mature human male in the large rubbish pit together with the food waste gives cause for thought.

I hope that the flavour of my remarks, in spite of my list of criticisms, can be seen to be highly favourable. Here is a report which is the first on the excavation of what in Britain would be called a small town. That in itself is almost unique. But then it comes from the middle of Belgium and yet is written in very English terms, and follows many British lines of thought, so that any reader who will try the crystal clear French can extend his horizons at will. I criticise the report as I would any good British report (and this is better than many), and I can hardly given any higher praise.

RICHARD REECE

MAXFIELD, Valerie, A. *The Military decorations of the Roman Army*. London, Batsford, 1981. 304 pp., 17 figs., 14 tables, 16 pls. £14.95.

The late Field Marshal Montgomery was interviewed by Bernard Levin and he is said to have stated that when sending his men into battles in which it was certain that some would lose their lives, he was able to bear the heavy burden of responsibility through reflecting three things. First, he did not risk their lives unnecessarily; second, he always treated his men with respect; third, they knew that if they were killed he would take steps to see that they had a decent burial. Had he been a Roman general of the Imperial period he would have added a fourth consideration, namely that (through the agency of the emperor) bravery in battle was always rewarded by a decoration – normally one appropriate to the rank of the recipient. (Not that one believes 'Monty' to have been ungenerous in this respect.) Dr Maxfield makes it clear from the outset that much of the success of the Roman army was based upon the positive incentives given to valour, over and above the attention given to training and discipline (including punishment) which has been emphasised by modern scholars.

This book is based upon a doctoral thesis presented at Durham University and is of major importance for Roman military historians as it is the first comprehensive study of the subject for 75 years, but its scope is wider than the title implies. Dr Maxfield does not merely examine the relevant epigraphic and other material that has come to light in the intervening years, but also sets it in

the context of the results of modern research on the Roman army and its relationship with the society of the day. In addition she writes with the needs of the student and general reader in mind since she begins with an exposition of the military background of Rome: an account of the orders of society from which commanders were drawn and the changes in career structures brought about through the growth of imperialism, followed by an analysis of the nature and organisation of the Roman army from the Republican period through to the late empire. She does not neglect to point out the difficulties inherent in the sorts of evidence available, nor does she gloss over the problems that remain – an important point in a book that is aimed at the non-specialist as well as the expert; it is all too easy for students to be misled by statements seemingly made *ex cathedra*. The forms of decorations are described with illustrations from sculptures and coins, where necessary supplemented with drawings, and the origins of the different types and their actual size and appearance are discussed beginning with the six kinds of *coronae* and then dealing with *vexilla, hastae purae, torques, armillae, phalerae, patellae* (or *phialai*) and *cornicula* (and in passing *clipei*).

We are given some surprising facts. The crowns which were of highest merit were not made of precious metal but of woven grass and oak leaves (*C. obsidionalis* and *C. civica* respectively) but the lesser ones of gold. In theory any Roman soldier could win the *C. Civica* for saving a fellow citizen's life, though he also had to hold his ground in that place for the rest of the day. We lack evidence for this award between the reigns of Nero and Severus and also after the reign of the latter (when *dona* of the traditional type begin to disappear in any case). This may be due to a gap in our sources, but Dr Maxfield raises the possibility of linking it with the increasing use of the *auxilia* in fighting from the late 1st century onwards, and points out that as non-citizens auxiliary soldiers were not eligible for the award. Apart from this one crown the scale of awards was related to the rank of the recipient, at least from the end of the 1st century AD, though earlier evidence on this point, particularly in the Republican period, is relatively slight. Beginning with an excursus on the triumph of Republican generals, which was reduced to *ornamenta triumphalia* – the trappings of victory without the triumphal procession (eventually these too were to go) – for beings less than emperors in the principate, we are taken down through the scale of awards from the senator to the humble *miles*. An intervening chapter deals with the who, why and when of the giving of awards. Tables are provided at every step so that the reader may judge the weight of the evidence for himself. Interestingly, equestrians were less shackled by their position in the hierarchy in the scale of *dona* they received than either senators or other ranks. Perhaps this reflects the variety of their origins and the multiplicity of ways in which they could rise in their careers (cf. Fig. 14, p. 159). Perhaps, as Dr Maxfield suggests, merit and individuality still played a part in their awards.

The ordinary legionary soldier was restricted to *torques, armillae,* and *phalerae* (though centurions and *primipilares* had crowns and, if they rose higher through to *primus pilus bis* or *praefectus castrorum,* could also receive *hastae* and *vexilla*). His auxiliary counterpart, on present evidence, was extremely unlikely to get *dona* at all. The few cases of awards recorded for members of the *auxilia* were seemingly made to those who were Roman citizens (with one exception).

Citizenship itself (coupled with the right to legally marry a non-Roman woman but acquire citizenship for the offspring of that union) was the main reward for 25 years faithful service of the auxiliary soldier from the reign of Claudius onwards, but personal grants of citizenship during service, and block grants to a unit as a battle honour, provided a tangible incentive to valour. Honorary titles acquired during campaigns probably carried less obvious benefits, but the glory of the epithet presumably gave a boost to the morale of the whole unit. Chapter XI, which deals with these matters, provides an extremely useful base on which to assess the possible use of certain units in specific campaigns. Two appendices give a helpful chronological table listing main military events (students take note!) and a list of all named recipients of military decorations. This reviewer predicts that this will be a standard work of reference, alongside Devijver, Pflaum *et al.*, for many years, but hopes too that the non-specialist will profit from the clarity of presentation of Roman military matters. Two small printing errors should be noted. Four *hastae* appear to have dropped out of the basic scale of the consular rank on p. 146; the title *fortis* was given to *II Traiana* (given by the printer through dittography as *II Parthica*), p. 233.

MARGARET M. ROXAN

CĂTĂNICIU, Ioana Bogdan. *Evolution of the system of defence works in Roman Dacia* (BAR Int. Ser. 116). Oxford, British Archaeological Reports, 1981. 121 pp., 85 figs. (including 11 photographs). £10.00.

The aim of this book, as stated in the foreword, is to review the results of research on the Roman *limes* of Dacia, particularly that undertaken in recent decades. It is divided into historical phases in eight chapters, ranging from pre-Roman Dacia through to the late 3rd century, although very

little historical background is given – some foreknowledge is assumed. The main emphasis is on the results of excavation but the author stresses the handicaps created through so many of the site reports remaining partially or even wholly unpublished, while for those that are available the absence of a well-founded pottery chronology for the various regions of Dacia makes it difficult to provide reasonable dating criteria unless there happen to be well-stratified coins or epigraphic data. That she has nevertheless attempted to provide non-Romanian archaeologists with a survey, including plans and sections for all forts for which there is some worthwhile evidence, must be heartily applauded. That said, it is a great pity that she chose to publish through BAR International Series since, admirable though the intentions of that series may be, her work could only have gained from careful editing and some improvement in the translation – services which BAR does not provide. In addition there is no list of figures – these would have been easier to follow if distributed in the text rather than collected at the end of the book particularly as the conventions used by Romanian archaeologists in section drawing are not always easy to interpret. The reproduction of the aerial photographs (included among the figures) is rather poor and some benefit would have been obtained from arrows pointing to the important features on these rather fuzzy plates. A large map (or maps) placing *all* the sites named would be useful for British scholars since the two main maps (Fig. 1, Trajanic defences, and Fig. 37, a general map of Roman defences) fail to include some of the less familiar place names based on villages difficult to locate without specialist resources.

On the credit side Mme Cătăniciu has worked carefully through the material and gives copious references in footnotes to where site reports may be found. She is critical of many of the conclusions found therein. One of her more interesting observations concerns the supposed Severan date attributed to the *limes Transalutanus* which she has been investigating for some years (cf. her contributions to the proceedings of the ninth, tenth and eleventh *limes* congresses, particularly in *Studien zu den Militärgrenzen Roms II,* Köln, 1977, 267–75). She points out that the famous coin hoard from Săpata de Jos may not be used to support this date. She is also unconvinced by the oversimplistic two-phase theory of fort building in Dacia which classes earthern forts as first phase and stone building under Pius, with repairs assigned to the 3rd century. She makes a plea for further excavation, and publication in order to clarify these matters. On the other hand (in spite of a section headed Addenda (111–15 concerning significant results of excavations carried out in 1979–80) she seems unaware of recent evidence from *colonia Ulpia Traiana* (Sarmizegetusa) which almost certainly places at least part of *legio IIII Flavia felix* in a camp (or fortress) there before the building of the *colonia.* Her work was in press before the publication of the new inscription of L. Fabius Iustus from Rasova (*Dacia NS,* **25,** 1981: 356–8), which places him as governor of Moesia inferior in AD 106. This confirms Sir Ronald Syme's date of 105–8 for Hunt's *pridianum* (contra R. O. Fink who preferred AD 99) and throws back the idea of Domitianic occupation of parts of Wallachia for archaeological confirmation or disproof (Chapter 1).

Mme Cătăniciu has demonstrated how far Romanian archaeologists have still to go before any true understanding of Roman defences in Dacia is reached but her work is none the less valuable. In sum, if the reader is prepared to work hard by consulting the references provided and perhaps comparing and contrasting the views expressed in this book with those of N. Gudea (in *Britannia,* **10,** 1979: 63–87, and *ANRW, II* (6): 849–87), there is much profitable information to be gained.

MARGARET M. ROXAN

FRAYN, J. M. *Subsistence farming in Roman Italy.* London, Centaur Press, 1979. 168 pp., 9 pls. £8.50.

Frayn's stated aim is 'to glimpse as fully as possible the life of the peasantry in Roman times'. Glimpses, unfortunately, are all that we get since the book lacks overall structure. However, Frayn has personal knowledge of the older farming practices which survive in the Italian countryside today, and this she exploits well to illuminate literary passages which mention aspects of humble rural life. Herein lies the main strength of the book, which abounds in detailed points and insights. But it is a pity, granted her special knowledge, that Frayn works primarily from the literary sources, which, when they do allude to agriculture, usually concern large estates. Frayn neatly exemplifies how firmly rooted the 'novel' villa system was in the traditional farming practices of peasant smallholdings, but some of the literary evidence could have been excised to admit more of the artistic evidence whose potential is richly illustrated by the lonely Plate 1. Frayn quotes Heichelheim's comment (1921) that 'to get a true picture of the country as a whole is, in the absence of statistics, not possible'. Some 60 years on a 'true' picture remains a mirage, but we do have, in ever-increasing quantity, the quasi-statistical indicators of the typology and chronology of agricultural settlements provided by archaeology, and especially by field surveys. The historian of the Romano-Italian peasantry should begin with a diachronic survey of the location and typology of small-scale agricultural units. Frayn

avoids such general issues. The question, for example, of integration with a money economy is barely discussed, and that of the extent and function of leasing not at all. We even lack an adequate definition of 'subsistence' farming: Frayn's subject is in fact 'small-scale' farming. Yet, whatever her omissions, there is much to be gleaned from Frayn's detailed discussions. And, after all, it is a welcome rarity for anyone to tackle this field.

D. W. RATHBONE

WALKER, Stephen (ed.). *Récentes recherches en archéologie gallo-romaine et paléochrétienne sur Lyon et sa région* (BAR Int. Ser. 108). Oxford, British Archaeological Reports, 1981. 339 pp., illus. £12.00.

This is the first collection of papers to be published in Britain on the subject of the capital of the Three Gauls, and one of the few easily available works for students outside France (together with Audin's *Lyon, Miroir des Gaules . . .* and Drinkwater's excellent article in *Britannia,* VI). This being the case, it must be said at the outset that the volume does not pretend to a comprehensive survey of the city and its surroundings, but as the title makes clear, is dedicated to research conducted in recent years, principally by a new and emerging generation of French (and, in the case of the editor, English) archaeologists. In several places conclusions are reached that differ markedly from traditional views, particularly on the vexed questions of possible pre-Roman origins (Desbat and Walker) and of the reasons for abandonment of parts of the city in the 3rd century (Desbat). To this reviewer at least, the new interpretations are convincing. The other papers in the volume include a most interesting and instructive insight into the history and politics of urban archaeology in Lyon, together with a comprehensive bibliography of the city (Walker), studies of counterfeiter's moulds from the city (Turcan) and a review of the progress since 1970 in the investigation of the various important early Christian churches (Reynaud). There are also two long studies of the rural territory to the west of Lyon; the *civitas* of the Segusiaves (Vallat) and the lands that probably belonged to the *territorium* of the city itself (Walker). The former study is the longest contribution to the volume, and varies uncertainly between analysis along Marxist lines and traditional historicist interpretations (e.g. of hoard deposition). Both, however, are valuable additions to the rapidly growing literature on the rural archaeology of Gaul.

The most significant article in the volume for archaeologists whose interests are not in Lyon itself is one by Desbat on earth walls. This presents the evidence, in an admirably clear fashion, for the presence of mud-bricks, wattle-and-daub, rammed earth walling and clay wall or ceiling surfaces. The evidence from the rue des Farges site is particularly well-preserved, and the abundant photographs and illustrations should serve to make this a key site in the study of these building techniques, the significance of which for the northern provinces is only just beginning to be realised.

The chief criticism of the volume is that the title encourages the reader to believe that this is a comprehensive review of recent research. It is not, since there is no mention of one of the most significant discoveries that Lyon has contributed to classical archaeology in recent years – that of 'arretine' pottery production at La Muette by Lasfargues. Perhaps the absence of contributions on this (and possibly also other apposite studies) is due to the apparently deep divisions that still separate Lyonnaise archaeological politics as a result of the excavation policies, or rather, lack of them, of the 1960s and 1970s. The appearance of the volume is marred by a number of maps that can only be described as bad, since they lack all topographical information except rivers, and sometimes omit north points and scales. Nevertheless, it is very welcome that such a collection of papers has been published, since it provides new material for the discussion of this most important site, and at the same time establishes a good basis for future work.

ANTHONY KING

SANDERS, I. F. *Roman Crete: an archaeological survey and gazetteer of late Hellenistic, Roman and early Byzantine Crete.* Warminster, Aris & Phillips, 1982. xiii + 185 pp., 64 figs., 72 pls. £18.00.

This is the example of the publication of a DPhil thesis, and is a good example of that species. It is pointless, in this case, to argue about the general principle of whether such theses ought to be published for Ian Sanders had died while the thesis was being prepared for submission. His wife, Janet, who had shared in much of the survey work, met the close time limits for the tidying up of loose ends, the thesis was submitted, and the doctorate was awarded posthumously. Now, with only minor changes the thesis is published and an excellent piece of research is available, as it ought to be, for a wide audience.

By choosing to study the whole of Crete in the Roman period Ian automatically limited himself, as he admitted, in depth. Thus this was to be a summary of what was known, put into the context of modern scholarship: detail was to follow. It is quite clear from the remarkably modest chapters on history, settlement patterns, economy, religion, art, architecture and Christian basilicas that, had he lived, there would have been a series of articles pushing each subject forward with new ideas and re-worked material. As it is we rest with the chapters – each of which is summarised, a concluding chapter, and a gazetteer which more than doubles the sites known to Pendlebury in 1939.

Through the plans of theatres and churches we can see Crete depending more for ideas on the Aegean islands and the mainland of Asia Minor than on its administrative links to Cyrene. Burial in rock-cut tombs seems to end with the advent of Christianity thus showing better links to Alexandria and the East than to Malta and Africa to the West. But the cycle of prosperity which he proposes, with peaks in the 1st and early 2nd centuries AD, and again in the 5th–6th centuries and troughs between fit better with the southern Mediterranean littoral than with points further north. The poorly represented years from 600 to 800 when Roman Crete continued when most other provinces crumbled is a usefully pinpointed puzzle.

I very much hope that some student will pick up this book, accept its gentle, humorous and scholarly challenge, and carry on from where Ian Sanders had to leave off.

RICHARD REECE

MÓCSY, A. (ed.). *Die spätrömische Festung und das Gräberfeld von Tokod.* Budapest, Akadémiai Kiadó, 1981. 263 pp., 45 pls. No price stated.

Tokod is one of those sites in Hungary which seems, at first sight, deceptively simple. It nestles in the northern bend of the Danube, obviously part of the late frontier defences, but set back from the river by several miles. and therefore a textbook part of the 'defence in depth' with its slightly irregular rectangular walls and towers consolidated and on display, and its one stone building in the interior, a granary.

But this report includes rather more than the late fort, and this is where the problems begin. On the hillside a little way away from the fort there is a series of buildings whose lives run from at least the mid-1st century beyond the 4th. There is also a late Roman cemetery, but topographically it does not belong obviously to either the settlement or the fort. And then there is the late Roman grey ware. In modern English terminology this is very much a 'level 4' report, with only the summaries of the various excavations and the occasional detailed publication of selected aspects such as the brick stamps, the late Roman grey wares, the ironwork and the grave groups. This means that the buildings and deposits are summarised so that there is no hope of solving any of the puzzles by reworking the evidence.

Probably the least archaeological evidence came from the fort or stone enclosure of the 4th century. There seems to have been little or no occupation inside it, and although there is some stratification which allows the dissection of at least two or three building periods there are very few datable finds in strategic deposits. The dating of the fort depends on the general material inside it, which belongs to the 4th century, a few late coins, and particularly the brick stamps naming seven people, one of whom may have been *dux Valeriae* 367–9, and then *comes et dux Armeniae* 369–74. Whether or not this dating is exact, the tile stamps do link the structure to other, better dated, parts of the late frontier system, and this is the least of the problems.

The cemetery is published in fair detail, with full drawings of the grave groups and summary tables of the finds. The bones are not dealt with grave by grave, but are summarised metrically in numerical tables from which certain attributes are extracted in order to perform a multivariate analysis which has been explained in detail elsewhere. In so far as I understand the analysis it shows that the Tokod population are closer in metrical detail to other late Roman populations in Hungary than to the well-known and intensively studied intrusive groups of the 4th and 5th centuries. The dating of the cemetery is one of the major problems for only two graves contain coins, and they are likely to be residual. The second main chronological prop, the typology of the cross-bow brooches, suggests a date after the end of the 4th century since the most common type of brooch has the pelta decorated foot. This is invariably the latest type of brooch in any cemetery so that although its introduction at the end of the 4th century is sure nothing is known about its life span.

The late Roman grey ware remains an intractable puzzle. The ware occurs on the settlement and in the fort, but not amongst the grave goods in the cemetery. It seems always to occur in the latest deposits and hence is rarely stratified, and never associated with good groups of coins. Some base sherds have crosses, stamps and chi-ro ornaments which seem very close to redslip ware of about

AD 460. Otheriwse the ware is a hard fired, well thrown coarse grey pottery of totally Roman form and fabric.

If the arguments summarised here are correct then the region of Tokod seems to extend the Roman way of life in Pannonia into a cemetery of the earlier 5th century, and an inhabited settlement and functional fort of the later 5th century. This is obviously a magnificent step forward, but before the dating can be regarded as completely secure we need the excavation and publication of another site which uses this grey ware, and we need the deposits published in full so that its stratigraphic and cultural associations may be seen complete.

RICHARD REECE

SALMON, E. T. *The making of Roman Italy* (Aspects of Greek and Roman Life). London, Thames and Hudson, 1982. xi + 212 pp., 51 pls., 4 maps. £12.00.

When compared with other titles in the series Aspects of Greek and Roman Life (Birds, Elephants, Animals, Death, Diplomacy, Festivals, Astronomy, etc.) the new contribution from Professor Salmon treats a familiar historical topic. Behind the famous stories of Horatius who kept the bridge, the geese who saved the Capitol from the Gauls, the self-sacrifice of Decius and the incorruptibility of Dentatus lies the transformation of peninsular Italy into a power which conquered the world almost as swiftly as Alexander's Macedon. Such difficult problems as the origins of the coloniae and municipia or the real impact of, and motives for the conferment of Roman citizenship are examined in a chapter (3) on the organisation of peninsular Italy. Those who know the author's earlier work in the same series on Roman colonisation or his study of the Samnites will not be surprised to find throughout a clear exposition of the present state of knowledge.

The principal value of the book is that it conveys in summary form a mass of new material evidence which has accrued since the Second World War. A new generation of historians and archeologists, both Italian and foreign, are now recovering a better understanding of the separate identities of peoples in different parts of Italy, not just the well-known Etruscans or Greek settlers but Latins,[1] Campanians, Umbrians and the often shadowy masses of the hill peoples, the pastoralists who, as the famous 2nd-century BC road inscription from Lucania records, 'were compelled to yield up public lands to the farmers'. For those who cannot cope with, or even get at the latest great Italian compilations (such as *Popoli e civilta dell'Italia antica*) the new survey by Professor Salmon is especially valuable. The illustrations include some of the latest discoveries but it must be said that the maps are generally inadequate to support a text that gives prominence to the physical environment that bore upon the material culture of the Italian peoples. In this respect some good aerial photographs (used so well in the author's *Samnium and the Samnites*) could have been a compensation.

Some will find a contradiction between the author's emphasis on the local identities in pre-Roman Italy, now made clearer through the excavations and surveys of archaeologists, and the assertion at the opening of the book that by AD 14 Italy was 'culturally homogeneous'. It is still difficult to discover the true condition of many areas of Italy after the time of Augustus. One wonders if a conclusion that Roman rule did not stifle the varied Italian genius (pp. 159–60) would have been accepted or even comprehended by peoples in such areas as Etruria or Campania after what they had endured in the 1st century BC. Regional identities are likely to have been as strong there in Roman times as they are today. One wonders also if the 'Roman outlook' went very deeply into Italian society: the Roman knight who at the races engaged Tacitus in learned discourse and enquired whether he came from Italy or the provinces (Pliny, *Letters*, ix, 23) may convey the sense, confined to a certain level of society, of integration and reconciliation for which Augustus had strived (p. 143 ff). Yet its cost soon became apparent in the declining condition of Italy indicated by results of recent excavations and the dearth of inscriptions.[2]

J. J. WILKES

[1] For a survey of recent work on early Roman and Latium Vetus see T. J. Cornell, *Archaeological Reports for 1979–80* (Hellenic Society), London, 1980, 71–89.

[2] The derelict condition of some large villas in the 2nd century may be instructive for the changes occurring in the economy of Italy, e.g. at Sette Finestre in Tuscany or S. Giovanni di Ruoti in Basilicata (on these see *Roman Villas in Italy* (ed. K. Painter), Br Mus Occasional Paper No 24, 1980).

SITWELL, N. H. H. *Roman roads of Europe.* London, Cassell, 1981. 240 pp., illus. £14.95.

This book gives at once much more and a little less than its title promises. It ranges Empire wide, with the first seven chapters on Europe, but then chapters each on Africa, Egypt and Asia, but it is not a textbook on Roman roads. The basis of the book as the author, and the dust jacket, readily admit is a series of 10 maps at the scale of about 80 miles to the inch, on which most of the geographical and administrative sources of the ancient world have been abstracted. I first saw the maps nearly 10 years ago and decided on the spot that the blend of individual lettering, absence of shading, and neo-18th century representation of mountains and marshes approached my ideal of what a map of the ancient world ought to look like. In print, my opinion stays the same. At this small scale, and leaving out of account detailed archaeological and topographical research, some maps will appear to devotees to be very thin. Thus about 20 roads for Britain out of the hundreds 'known' can only lay down the basic pattern; the roads of the title are the A-roads of the Roman Empire.

The maps are accompanied by two other sources of information. About 95 colour photographs range much more widely than just trodden surfaces, though these do figure prominently, to give us a glimpse of each of the areas of the Empire covered. The subjects are often unusual, though the essential stand-bys such as the Pont du Gard are there, and most of them clearly amplify something that has been said in words in the text. In the text Nigel Sitwell has somehow managed to introduce us to the whole of the Roman Empire up to the mid-2nd century AD.

As a university text it may well be that specialists in each area may have a few points of fact that they would wish to correct, and some matters of emphasis to change, but read as a connected whole this seems to me to give an unrivalled basic guide to the problems and solutions, both geographical and military, which created the Empire. Explanations of technical terms are invariably given, so the interested beginner should have no difficulty, and much of the detail is given in modern terms. At first sight the 'oil sheikhs of Leptis Magna' might seem a trendy annoyance, till reflection enforces the admission that the description is just, provided (olive) oil is understood. This is a readable, accurate, human and intelligent book, and I hope that is the first of many.

RICHARD REECE

Les fouilles protohistoriques dans la vallée d l'Aisne - 6. Rapport d' Activité, 1978. Université de Paris I (Pantheon-Sorbonne) – UER Art et Archeologie. Paris, 1982.

The valley of the river Aisne, NE of Paris, which has a considerable concentration of sites from the early Neolithic onwards, is also the projected site for a motorway and a new canal. In a valley sometimes no more than a mile across this will leave very little for posterity, so a major excavation programme is under way masterminded from the University of Paris I. This sixth report aims to put out the basic information recovered so that the investors have some immediate return for their money, and so that interested archaeologists know what has been found in the way of structures, from Neolithic long houses to a nucleated settlement of the last centuries BC.

The volume is a series of substantial interim site reports on 267 duplicated sides of text and 126 pages of figures, but it is rather more useful than the average British interim, if far less glossy, since it gives much of the basic record in terms of post-hole profiles, sections, plans, pottery drawings, and descriptions and drawings of flints. This means that a researcher anywhere with this report to hand could use the pottery or flint finds for his or her own purposes, though we have only the briefest of beautiful thoughts about the deeper meaning of each of the sites.

This is an idea and a format which large or long-term British sites would do well to ponder. It would be interesting for instance to compare the costing of the production of this report with one of the wasteful interims, complete with semi-final drawings and several half-tone plates, that have been a common feature of the *Antiquaries Journal.* There a prestige report gives the nicest ideas with the minimum of basic information with no direct bearing on any final report; here much of the final work seems to have been done, and a useful compilation of basic data has been (temporarily – for the glue is not too good) stuck together and sent out into the world to fend for itself till the final report is published.

But perhaps this is just another of my blasts in favour of the actual study of ancient monuments, rather than the refined production by excavators and editors of monuments to themselves, based on ancient information.

RICHARD REECE

BRIANT, Pierre. *Etat et pasteurs au Moyen-Orient ancien.* Cambridge, Cambridge University Press, 1982, 2 pp., 27 illus. £25.00.

This book is another of the increasing number of books on this subject to appear in recent years. It is divided into four long chapters which examine, respectively, the nature of the evidence concerning ancient pastoral nomad groups, the agropastoral societies of the Zagros, the earliest Arabs, and the Scythians. Although the chronological framework of the study is said to be set during the Achaemenid Empire and the early Helenistic Period, it does in fact cover, quite thoroughly in places, a considerably longer period.

There is a great deal of thoroughly refreshing work in this book. We may note with complete approval the recognition on the opening page of the first chapter (p. 9) of the fact that the ancient pastoral nomadic groups, which were at most organised as chiefdoms (or perhaps as secondary tribes), covered in the study are seen, in the textual records, exclusively through the eyes of the officials and/or citizens of the state-organised societies with which they came in contact, and which, because the pastoralists could not easily be brought under the political and social control of the state, tended to characterise them as barbaric (i.e. different from, and perhaps less human than, themselves). The first chapter is concerned with the examination of the results of this viewpoint in the work of the ancient writers, and the way in which it should affect our use of the ancient texts.

In particular, Briant shows (pp. 12–17) clearly how the category 'nomad' is used as the antonym of the category 'peasant' or (more generally) 'agriculturalist' in the works of the ancient Greek writers, and how the category of agriculturalists is markedly more highly valued, and the 'nomad' (meaning, usually, pastoral nomad), way of life quite deliberately devalued. He also shows (pp. 35–7) how exactly the same bias may be seen in the work of the ancient Mesopotamian writers.

It seems a great pity that in an otherwise excellent treatment of the problem of ethnic names, there is no reference to the fundamental work on the subject by Fried (*The Evolution of Political Society* (New York, Random House, 1967), 154–74; *The Notion of Tribe* (Menlo Park, California, Cummings, 1975). Indeed, there is a signal lack of reference to the work of English-speaking anthropologists on the subject of the relationships between pastoral nomads and their sedentary neighbours, and the social structure and political organisation of the pastoral nomads themselves, of which a great deal has been published in the 1970s (Dyson-Hudson and Dyson-Hudson, 'Nomadic pastoralism', *Annual Review of Anthropology* 9 (1980), 15–61). This is particularly sad in view of the way the excellent study of the economics of subsistence of these 'pastoral nomad' groups made by Briant, which reveals both the extent of their sedentary and agricultural activities, and the true nature of their relations with their state-organised neighbours, agrees with many of the findings of recent studies of contemporary 'pastoral nomad' groups Of particular interest is the reference (p. 93) to the way in which the Persians strengthened the authority of the 'tribal chiefs'. If one accepts the findings of Fried, one might go as far as to assert that the activities of the Persian state were responsible for the creation of both the tribal chiefs and the tribes themselves. The study of the early Arab groups and of the Scythians are extremely interesting, and, with the study of the groups in the Zagros, should be seen as a major contribution to an increase in the breadth, depth, and clarity of our perception of the pastoral nomad groups in the ancient Near East.

Two minor criticisms may be offered: (1) the lettering on some of the figures, Fig. 4 for example, could be considerably clearer; and (2) it would have been much better if *all* of the works cited in the text had been included in the bibliography, rather than including some, with others only appearing in the footnotes as has been done. At the same time, it is refreshing to see full bibliographical references, rather than the partial ones supplied by so many scholars.

To sum up, then, this is an excellent book, and deserves a careful reading by anyone interested in the subject of pastoral nomadic groups in the ancient Near East.

RUPERT CHAPMAN

DE GRAEVE, Marie-Christian. *The ships of the ancient Near East (c. 2000–500 BC)* (Orientalia Lovaniensia Analecta 7). Leuven, Katholicke Universiteit, Department Oriëntalistiek, 1981. xiv + 225 pp., 59 pls., 2 maps. Bfr 1800.

The period covered by this book is a millennium and a half from 2500–500 BC. It is mainly concerned with Mesopotamia rather than the Near or rather Middle East in general. It commences with a section on historical geography and the physical geography of the Tigris and Euphrates rivers. A catalogue of various vessels follows dating from the Old Babylonian to the Persian Period. Then types of craft are listed – inflated skins, skin boats, wooden boats and finally sea-going ships. These are divided into Hippoi, merchant and war ships and are the only vessels to fall within the category of the

title. The catalogue has involved considerable work and research which makes it a useful reference volume. There is a nautical glossary in four languages, English, French, German and Dutch but not in the ancient languages of the region, as Akkadian and Assyrian.

The material remains of boats are missing from Mesopotamia due largely to the swiftness of the currents in the Mesopotamian rivers. This is made up for by the excellent pictorial representations though these are often over-simplified and stylised. Several items are not considered – the development if any of boat design over a millennium and a half, the uses to which these riverine boats were put, and their size. There is no ancient information about building reed boats from Mesopotamia but there is plenty about their construction – in books like Wilfred Thesiger's *Marsh Arabs.* In fact if one has a criticism of this book it is that not enough use has been made of comparative material on the spot as local methods of boats and boat building have not changed here for many centuries, although more wooden boats are now being introduced.

The boat model from Uruk which originally had wheels has been suggested as a child's toy; this in the Near East seems unlikely as most boats on wheels have a funerary context. For example the silver boat found in the Tomb of Queen Ah-hotpe, mother of King Ahmose of the XVIIIth dynasty (1570–1546 BC) and the other Scandinavian boats.

It was a good idea to have a section on pontoon bridges in an appendix as they tend to pass unnoticed generally. Also the portion on propulsion has some useful information. This book should serve as a useful work of reference for shipping in Mesopotamia.

M. V. SETON-WILLIAMS

HOFFMAN, Michael, A. *Egypt before the pharaohs: the prehistoric foundation of Egyptian civilization.* London, Routledge & Kegan Paul, 1980. xxi + 391 pp., 84 pls. £9.95.

The title of this book is to some extent rather misleading as the material covered goes as far as the end of the Second Dynasty or well into the Pharaonic age. Indeed the period covered is so immense, i.e. from nearly one million years ago until about 2700 BC that the treatment must at times be very general, not to say superficial. Nevertheless, as the author says a book of general type is badly needed for the prehistoric period in Egypt, the more so as the monumental study undertaken by Hayes, *Most Ancient Egypt,* was left incomplete by his untimely death. In his preface Hoffman points out that it also predated the Aswan Dam projects and all the subsquent work in Nubia, especially before that of Wendorf was published. That this work is also aimed at the general public and not the specialist is at once evidence, the more so as the author sees fit to adopt a style at times fairly loaded with 'purple passages'.

Owing to the huge scale of the canvas used by Hoffman it is necessary to go through the book section by section to try to see the relative merits of its parts which one fears like the proverbial curate's egg are variable. Right from the start it would have helped the general reader, who must be assumed to have no great knowledge of the background, if the writer had made plain certain questions of terminology and approach adopted. Thus there is no reference to Mesolithic as in earlier works on Egyptian prehistory, terms such as Epi palaeolithic are substituted here, but the implications are not made clear in the text. Once could also wish that the writer had not constantly been sidetracked into endless anecdotes about Egyptologists such as Petrie, thus using up much space on often irrelevant stories at the expense of useful information on the earlier inhabitants of the Nile Valley and Delta.

In Part I, which forms the introduction, a helpful table (no. III) gives the main cultural phases from Miocene down to Sahaba-Darau about 10,000 years ago with environmental conditions. Part II covers the Palaeolithic Age *c.* 700,000–5500 BC and traces the study of this subject in Egypt from the early work of Arcelin, Hamy and Lenormant in 1869. The Sandford and Arkell survey is described and how these two applied the system of sequencing river terraces, as used by European prehistorians for dating the Somme material, to those of the Nile valley. Relevant criticisms of this methodology by Rushdi Said are quoted to show that when used in a country where several streams followed on another at long periods of intense tectonics and erosion this must be allowed for. Schweinfurth and the 'eoliths' of the Nile valley are disposed of, and the earliest known tools from the Abu Simbel cliffs are dated to the Lower Pleistocene *c.* 700,000 years ago. The writer interestingly links this with the idea of a Nilotic corridor route for the earliest men who may have originated in Africa about 2,000,000 years ago as shown by the sites such as Olduvai Gorge, and who could thus have left their place of origin to settle in other parts of the Old World via this route.

Acheulean 250,000 BP and Mousterian 90,000–30,000 BP industries were first located by Caton-Thompson and Gardner in the western desert, and their work was later followed up by the important 1960s survey. The importance of Arkin near Wadi Halfa is rightly stressed; that is a site with the earliest known shelters or house-like structures in Egypt or the Sudan, a fact which Hoffman notes

places them among the earliest dwellings in the world after the stone ring dwelling at Olduvai. Typical was one in the form of an oval pit 30 cm deep and 1.8 m long by 1.2 m broad, but a humble ancestor surely of Pharaonic palaces or even with its floor lined with flat sandstone slabs of pyramids and temples! The site also gave a rare insight into daily life during late Acheulean times.

The latest discoveries of Wendorf relating to food production, if not actual farming, on sites at Wadi Kubbaniyeh published in *Science* in 1979 appear to have been too recent for the author to have included them in this book, but readers are referred to them as antedating the possible use of grain barley in the Nile Valley from 12,000 BC to 18,000 years ago. In this section Hoffman relies heavily on Wendorf and associates, but succeeds in giving a much more up to date picture than is usual in such accounts

Part III covers the predynastic peoples of upper Egypt *c.* 5500–3000 BC. This section scarcely does justice to de Morgan who as the writer himself admits was, rather than Petrie, the discoverer of the predynastic cultures of upper Egypt, and whose important work and discoveries at Dahshur are not even mentioned. But Hoffman does make the important point that disturbed bones, and in one case with teeth marks of a human or animal on them, do not prove cannibalism, rather traces of burning are needed. Likewise reburial and human sacrifice are also possibilities the latter being well attested among early peoples of the ancient Orient.

The account of sequence dating, now frequently termed 'seriation' is woefully inadequate and does not give the reader much enlightenment on how this was worked out nor place it in the context of other similar efforts in the field. A number of minor inaccuracies creep in from time to time, thus on p. 121 the statement that Petrie 'was succeeded in his post by a former student Margaret Murray in 1932' is incorrect. Dr Murray was never Edward's Professor the next, Glanville, being appointed Reader in 1933, and Professor two years later, while Miss Murray was assistant Professor 1924–35.

Hoffman properly criticises Baumgartel's bias against the northern and Delta sites, an obsession which coloured her otherwise useful work of reassessment of Upper Egyptian site material.

Chapter 8 is devoted to Hierakonpolis which is the author's strong point and as expected the best parts of the book are to be found in the sections dealing with this site. There is much useful information but the account would have been much helped by a plan of the temple area and a map of the town site in general. Chapter 9 covers Brunton and the Badarian period, and Caton-Thompson's work at Hemamieh is praised as being well ahead of its time in the Near East. One very important point made is that this site produced a pottery sequence running right through from Badarian to Gerzean, i.e. 5000–3500 BC, and Hoffman even suggests it is the only site to date to have produced 'clear stratigraphic proof of Petrie's system of sequence dating'. In his remarks in this context Hoffman quotes recent radiocarbon dating to suggest what was always feasible, the overlapping of phases of Badarian and Amratian, and even more important the use of thermoluminescence which has actually pushed back the date of the earliest Badarian material to the 6th century BC. Here again one is struck by fact of the writer's giving a good analysis of people's work in this field but not according adequate coverage to the cultures themselves, especially with regard to what Brunton actually found. This basic material is in fact forced into the next chapter along with all the other cultures covered.

Much more satisfactory is the follow up of Butzer's conclusions that certain Upper Egyptian regions previously thought to be among the poorest in agricultural potential were in reality the richest and most populous during the late predynastic period. This contention supports Hoffman's own ideas based on his discoveries that show the advanced nature of the Hierakonpolis site at this time. Based as it is on the premise that there was a wetter climate in the period 7000–3000/2500 BC due to more rainfall, the implications are of fundamental importance for Egypt as a whole. These factors could therefore account for the rise of Hierakonpolis with perhaps desert communities living in areas now arid.

Part IV then returns to a discussion of the Lower Egyptian cultures *c.* 5500–3100 BC. It begins with Merimde whose corrected carbon-14 dates 4880–4280 BC fit in well with Badarian Hemamieh's thermoluminescence dating 5580–4360 as the writer demonstrates. The former may be compared for interest with the Larsen figures quoted by Hayes (*op. cit.*) of 5040 (or 5290) to 4350 (4570) BC. There is a better integrated and more thorough description here giving a more representative account than of the Upper Egyptian cultures.

Chapter 13 covering the Fayum gives Hoffman a chance to point out that B sites dated by Caton-Thompson as later than those called A are now known to be in the wrong order, hence the camp sites precede the ones with domesticated grain and animals as might be expected. The importance of the lake levels and their interpretation is stressed here. Even before carbon-14 dates suggested the B phase was the earlier the idea of a rise in the lake level causing settlers to retreat to the higher beaches had obvious implications. Ball and others had given excellent reasons for rejecting Caton-Thompson's disbelief in a high level lake during the Twelfth Dynasty to Ptolemaic periods, and earlier fluctuations upwards as well as down now seem indicated. Chapter 14 on El Omari supports Debono's date of *c.* 4000 BC and is in turn reinforced by the revised radiocarbon date. Hoffman notes the advances made in burials and the possibility of the use of the *slow wheel* for pottery.

Chapter 15 continues with Maadi which the writer sees as the period of Egypt's entry into a greater world of culture stretching from the west Mediterranean lands to the Indus Valley 3600–3000 BC. Thus links between the underground houses here and those of Beersheba in Palestine are cited, as well as the wealth of copper indicating trade if not expeditions. Helen Kantor's valuable work in the identification of imported pottery is quoted as showing connections with both upper Egypt and Palestine. The implication that donkey caravans were used in the transport of these wares shows the author's imaginative approach to this question, and seems very plausible, as also his sensible stressing of the fact that it was oils or contents that were the cause of such effort rather than the need for the actual jars themselves. p. 208: Menes' city of Memphis is hardly '10 kilometres north of Maadi' being in fact south and west across the river. Here is some apparent confusion with Heliopolis!

Part V deals with the Frontier Peoples 6000–3100 BC. The importance of Nabta Playa, a neolithic site in the desert west of Abu Simbel, cannot be too much stressed in this context. A culture existed here 6000–4000 BC, the earliest phase using a wavy-lined pottery similar to the early Khartoum ware discovered by Arkell, thus justifying his view that this was the earliest known pottery of the Nile valley dating from a period associated with an early wet phase. The latest is a burnished type thus perhaps showing ceramic connections with the upper Egyptian predynastic sites. Rock drawings and their significance are also discussed in this section. Under Nubia the writer's fixation with Egypt's divine kingship is evidenced once again here in the misplaced attempt to try to refute Frakfort's approach as to the basically African background of much Pharaonic ritual. The idea of a somehow 'egalitarian' Nubian society at the time of Egyptian expansion south seems to this reader as absurd as the similar hypothesis for the late predynastic Delta society as opposed to that of Upper Egypt, based as it is on scanty and for the most part irrelevant archaeological evidence.

Part VI covers the vital formative period that took Egypt from prehistory to history, *c.* 3100–2700 BC. In his approach to the question as to where the kings of the First Dynasty were buried Hoffman shows some inconsistency, as for example noting the identification of the new Pharaohs with bulls and the use of bull's horns as decorative features around the early dynastic tombs at Saqqara, yet following Kemp in suggesting that their actual burial place was at Abydos. In this context the reconstruction of the small type superstructure of the tomb of Ka'a at Abydos (p. 271, Fig. 66) which although unlike other essays in this direction only covers the central burial chamber area, does indeed look convincing, but also amply demonstrates the *relative insignificance* of these burial mounds compared with the huge tomb superstructures at Saqqara. Again the statement made doubtless from following Kemp's identification of the enclosures known as the 'Tombs of the Courtiers' with First Dynasty funerary palaces analogous to the Shunehs nearby, compounds an error yet further; 'Peet . . . discovered a portion of a large mud-brick wall in 1913 inside the circuit of burial trenches'. This is misleading in that the said wall simply consisted of a short section in height and width comparable to one of the low outer enclosure walls of the Saqqara tombs, while nothing to date has been recovered on the scale of the great 'palace facade' walls there. Another partly incorrect statement is that the Shunet ez Zebib (not Zebid!) has never been excavated. Partial excavations were carried out on it in the early 1900s and a small building, possibly a wine store, found inside it.

p. 280: It is not certain that Hor-Aha was Menes, Narmer also has a strong claim to be the first Pharaoh, neither is there certain evidence that Neith-hotep was 'the daughter and heiress of a powerful southern chief', indeed the name suggests northern connections.

p. 284: the statement that 'many of the so-called *sati* burials at Saqqara could have been interred after (or even before) the death of their lord' is extremely dubious, in view of the fact that in the earlier examples such as those around 3504 the architectural form used for them, i.e. mass trenching, is similar to the Abydos method, and would constitute a problem if not filled at *one time.*

The whole question of the royal burials of the First Dynasty is in fact not adequately discussed at all, and the writer falls back on such old cliches as 'the balance of professional opinion still favours the idea that most of the Archaic kings were buried at Abydos', rather than give concrete evidence for his opinion. The contrary view to Emery's is suggested, viz. that the Saqqara tombs represent the cenotaphs of the kings and queens and those at Abydos the true resting places, which is ingenious if hardly novel, but the same arguments hold good here, remains of bodies were also found in the main Saqqara pits! Hoffman also appears to have totally misunderstood the function of the royal seal bearer here.

p. 304: Petrie's dynastic race has become Emery's 'master race' with what connotations is perhaps best left alone!

Finally, in the last part of the book there are some good points about Egypt's so-called lack of cities, and its falsity as a theory is shown if it is remembered that different kinds of urban development could have taken place in Egypt and Mesopotamia. The writer's main theme again seems to be an exploration of the idea of increased population forming a stimulus to the growth of civilisation. The Palermo Stone inundation records are used by Hoffman to support his very interesting contention, but they are hardly followed up.

In conclusion it may be remarked that there is a fairly full and general bibliography which is on

occasion not fully up to date, and index and notes and references. These last are the weakest part of the layout of the book being not done to recognised convention and inadequate at times in details, thereby making it harder for the reader to follow up material.

This is a book with much valuable information and some good ideas expressed as to the interpretation of Egyptian prehistory, but breaks down through attempting to cover too much ground, and is marred by unsystematic presentation and at times a too self-conscious popular style.

E. P. UPHILL

CLAYTON, P. A. *The rediscovery of Ancient Egypt: artists and travellers in the 19th century.* London, Thames and Hudson, 1982. 192 pp., 30 colour pls., 152 black-and-white illus. £16.00.

So much superlative material exists for this book that the final choice must have been difficult. Not the least of the author's problems must have been the temptation to let purely artistic considerations prevail over archaeological ones. While admirable results of a different kind might have followed such a lapse, this is a most welcome compilation, especially since many of the sources are not easily accessible, some indeed having previously been unpublished.

An introduction traces the course of exploration in Egypt from the time of Herodotus to the end of the 19th century. This section has been well researched and documented, effective use having been made of the author's special interest in commemorative medals. The remainder of the work consists largely of extracts from travellers' journals illustrated by contemporary drawings and paintings, these being provided with separate commentaries and (at the end of the book) tabulated documentation. The travellers include well-known figures such as G. Belzoni, D. V. Denon, Amelia B. Edwards and R. Lepsius as well as lesser-known diarists, while the illustrations are due to some 30 artists, notably D. Roberts, C. Barry, D. V. Denon and the various contributors to the official *Description de l'Égypte* inaugurated by Napoleon. Some of the plates are of considerable artistic merit, and as a result those included solely for their contents suffer by the comparison. Nevertheless, an indifferent sketch may be all that remains of a monument which has now vanished.

The arrangement of the material is topographical starting with Alexandria and ending with Abu Simbel, the itinerary being divided into three sections: Lower Egypt, Upper Egypt and Nubia. Some readers may be surprised to find both Memphis and Saqqara included in Upper Egypt (incidentally, the positions of these two sites should be interchanged on the map on p. 56), and their confusion may be increased by the insertion of a group of plates with commentaries concerning more southerly sites between descriptions of Giza and Memphis. Although this kind of displacement is common enough with plates, it is especially disconcerting where much textual matter accompanies them. It is also curious that Tuna el Gebel, as the site of a boundary stela of Akhenaten, is included, but not Tell el Amarna.

One can think of other travellers and artists who might have been represented, and one wonders also whether some use might have been made of contemporary photographs. However, in a work of this scale the author is surely entitled to his preferences. The commentary is helpful and generally reliable. In remarking that 'ancient Egyptians did not know the wheel' (p. 181) he presumably meant that for moving heavy loads they preferred rollers, as Belzoni did. Purists may also object to the spelling Mykerinus. However, apart from small blemishes the work is a mine of useful information, and ends with a fascinating study of the influence of ancient Egypt on art of the 19th century, a subject of which one would have liked more.

H. M. STEWART

BOURRIAU, Janine. *Umm el Ga'ab pottery from the Nile valley before the Arab conquest* (Catalogue of an exhibition organised by the Fitzwillian Museum, Cambridge, 6 October to 11 December 1981). Cambridge, Cambridge University Press, 1981. 142 pp., illus. £20.00.

This book forms the catalogue of an exhibition organised by the Fitzwilliam Museum from 6 October to 11 December 1981. It is divided into 16 sections classified according to period and various subjects including some with scientific background. In order to make the material more representative a considerable number of exhibits were loaned by five other collections, the Ashmolean, British Museum, City of Birmingham Museum, Museum of Classical Archaeology Cambridge, and the Petrie Collection, University College London.

This is a book which deals with facts rather than theories and is thus of value to both specialist and those with a general informed interest. Bourriau gets straight down to basics with her first section on technology, covering potters, kilns and clays, giving analyses of materials and using tomb

scenes as illustration. Representative types are then shown. Next covered is decoration followed by a concise account of the process involved in using thermoluminescence. One important omission must be noted here, the lack of any reference to the results obtained when this technique was applied by Caton-Thompson to Badarian pottery, apart from a brief mention in passing on p. 44. Readers are referred to the review of Hoffman in this number of the *Bulletin* for this.

Important historical results are shown to follow the breakdown of Yahudiya were dated to the Second Intermediate Period *c.* 1750–1550 BC by neutron-activation analysis, in that two types are now identified, one found in the Levant the other manufactured in Egypt. Equally interesting although perhaps more controversial is the suggestion by the writer that following the breakdown of central authority at the end of the Middle Kingdom, trade increased up and down the Nile valley and to the Levant rather than becoming less. Whether this is based on a purely ceramic view is not stated, but it does go against the picture given by certain Egyptian texts of the time, and should perhaps be seen against a background that cannot assess movement of consumables. A shift from trade at the highest level, that is royal and state conducted, to a more general movement of goods at a lower level is another possibility here, at least as regards foreign commerce.

The next sections cover Egyptian pottery throughout prehistory and historical periods until the Coptic material, and are followed by two more devoted to Nubia and the Sudan. On the question of the Tasian phase of Badarian the author follows recent revised dating and places it during the latter part of the period, and uses Kaiser's modifications of Petrie's subdivisions of the later Predynastic Period. Into this argument incised decoration must enter and readers are again referred to the review of Hoffman where the question is discussed under Nabta Playa which shows the sequence of wavy-lined and burnished pottery at a very early date.

The section on Magic and Ritual illustrates canopic and shabti jars, one bearing a Letter to the Dead, and ritual *hs* vases no. 232 with its black wash imitating stone being particularly attractive. Under trade connections come wine jars once containing Delta wine, Mycenaean stirrup jars and perfume flasks, Cypriot opium jugs and vessels from Palestine and Syria. Foreign influences on Egyptian pottery are also covered.

There is a simplified chronological table, a map of the principal sites yielding ceramics, a short but good bibliography of journals and publications, and finally a concordance of museum and catalogue numbers for identification of exhbits.

Although such a work as this does not enter into new fields it is nevertheless an excellent production which can be commended to students and general public alike as a good introduction to the vast subject of Egyptian ceramics.

E. P. UPHILL

FINEGAN, Jack. *The archaeology of the New Testament: the Mediterranean world of the early Christian apostles.* Boulder (Colorado), Westview Press; London, Croom Helm, 1981. xxxii + 250 pp., 126 figs. 13 maps, 22 plans. £19.95.

It is difficult to see what readership was intended for this book. Although it lists the sites visited by St Paul most of the information about them is not relevant to New Testament times. The gold mask from shaft grave V at Mycenae (not the fifth Royal Tomb and not now 'often thought to be Agamemnon' – it is about four centuries too early) and a replica of a mural from Knossos are certainly entirely irrelevant, but so is the noble classical bronze of Poseidon from Cape Artemision, here presented in the worst photograph of an ancient statue I have seen in any book. There is also a plate of the 19th-century west front of San Paolo fuori le Mura and another of the Corinth canal, presumably to provide balance.

Much of the text is fairly reliable in broad outline although the writing is often made unnecessarily dense, through Professor Finegan's desire to cram in as many facts as possible, and the reader has to suspend belief when he is informed of 'micrographic' lettering on coins and directed to an unpublished manuscript in the author's possession.

It has often seemed to me that the book of *Acts* would make a splendid basis for a guide, but such a venture requires tight discipline and a choice of pertinent photographs in order to be a success. As it is I sigh for F. van der Meer and Christine Mohrmann's *Atlas of the early Christian world* published in 1958 and now out of print.

MARTIN HENIG

FINEGAN, Jack *Archaeological history of the ancient Middle East.* Folkestone, Dawson and Sons, xxvii + 456 pp., 121 figs., 40 tables, 4 maps. £15.00.

This book represents an heroic effort of compression, covering the period from 10,000 to 330 BC in both Mesopotamia and Egypt (with brief excursi on Anatolia and Persia) in, effectively, only 349 octavo pages. Such efforts always pose severe limits on what the author can include, which must

be borne in mind when judging the result. As always, criticisms and comments may be divided into general and specific categories.

To begin with the general, on the inside front flap of the dust jacket of this book it is stated: 'Most of the materials that have survived are associated with the activities of rulers, priests, scribes and artists. As a result political history and religious themes predominate, although there are also intriguing glimpses of the day-to-day life of the common people.' This is not, of course, strictly true: most of the materials which have been excavated, recorded, and published by scholars working in Egyptian and Mesopotamian studies are associated with the activities of rulers, priests, scribes and artists, because these are the groups in whose activities archaeologists and textual scholars have been interested. This concentration of interest results from the 19th-century concept of history as essentially royal annals; what Leslie White and E. H. Carr have called 'the great-man theory of history', combined with an art-historical approach to the study of artefacts, the idea of economic and social history, and of the functional study of artefacts other than 'art' objects, is alien to such a conceptual framework. To the extent that this is true of this book, this means that its contents are 'archaeological history' only in a very special and rather old-fashioned sense of the meaning of these two terms. At the same time, it must be said that this book, in accepting this approach to the material covered, is following the mainstream tradition of Near Eastern scholarship, and that it is only in recent years that a younger generation, influenced by the work of archaeologists such as Childe, anthropologists such as Harris, and historians such as Braudel, has begun to be dissatisfied with this tradition and to pioneer new concepts of history, archaeology, and the new approach to the material which these demand, and that within the rather narrow limits set by its traditional framework this is an excellent book.

As for particulars, the reader will have frequent reason to be grateful for the many excellent tables, which gives names and dates in the clearest possible form, and for the excellent footnotes, which provide sources for further reading. The use of the old system of collecting the notes, which tend to be too discursive, at the back of the book does, however, bring home once more the advantages of the Harvard (or author–date) reference system, while the lack of a bibliography is a baffling annoyance.

Several chronological points are worth noting: Finegan accepts a low dating for the Egyptian New Kingdom (18th Dynasty – 1552–1306; 19th and 20th Dynasties – 1306–1070) and a high dating for David (1010–970) and Solomon (970–931). Within the 18th Egyptian Dynasty, the 17-year reign of Akhenaten is placed after that of Amenhotpe III (with no co-regency), but the view that Smenkhare and Tutankhamun were the sons of Amenhotpe III is accepted, as is the view that Tutankhamun was only nine years old when he succeeded Akhenaten. It should also be noted that in his various references to them, Finegan appears to take the historicity of the Patriarchs, the sojourn in Egypt, and the Biblical figures for the length of the Egyptian sojourn and the data of the Exodus more seriously than most scholars are inclined to do today.

In sum, this is a well written and illustrated book, which contains a great deal of useful information within a rather narrow and old-fashioned framework.

RUPERT CHAPMAN

BERMANT, Chaim and WEITZMAN, Michael. *Ebla: an archaeological enigma.* London, Weidenfeld and Nicolson, 1979. xii + 244 pp., 31 pls. £7.50.

This book is yet another illustration of the tremendous extent of the public's interest in archaeology, and the first chapter of the book is a sad, and graphic, illustration of what can happen when the task of informing that interest goes out of control. The rights and wrongs of the controversy which has surrounded the discoveries at Tell Mardikh must, however, be left to the reader's own judgement; in the reviewer's judgement the exposition of this controversy is the least significant part of this book.

Two points which must be borne in mind when reading this book are that neither of the authors has any official connection with the excavation team, and that neither of the authors is an archaeologist. The latter point is most graphically illustrated by the statement that: 'There is nothing more important to the archaeologist than the written word . . .' (p. 4), a statement which could only be made by a textual scholar, such as Weitzman, who has failed to understand the full scope of the 'social and economic' (p. 16) information which may be derived from archaeological evidence, concerning historic as well as prehistoric cultures and sites, a point which has long been understood by scholars studying the Classical and Medieval periods in Europe and the Near East.

Aside from its chapters introducing the site of Ebla itself, the most useful contribution of this book is made in the chapters which provide an introduction to, respectively, Biblical criticism and the contribution made by archaeology to our knowledge of the cultural history of the ancient Near East (Chapter 3), and the history and problems of textural studies in the ancient Near East (Chapter 4).

Two criticisms may be offered of Chapter 3. (1) It is a great pity that, in such an introductory text, more attention has not been given to the effects which the development of the theory and practice of archaeological and recording techniques has had on the reliability of reported archaeological evidence. In particular, a useful contrast might have been drawn between the reliability of the evidence produced by the earlier excavations of Gezer by Macalister and the later excavations by Dever (p. 61), or the early excavations at Jericho by Garstang and the later excavations by Kenyon (p. 59), and an exposition on the causes of these differences in reliability might then have been provided. This is a point of general importance in the consideration of archaeological evidence. (2) In the reviewer's opinion, both Biblical criticism and archaeological analysis in the ancient Near East suffer badly from a lack of contact with modern cultural anthropology. In Biblical criticism this takes the form of a tendency to fail to see that there are ethnographic parallels for such aspects of the Biblical accounts as the career of Moses as described in the Pentateuch, and for the apparently shifting and changing tribal genealogies of the Israelites, and a consequent failure to understand the nature and probable degree of historical content of some of these accounts. In archaeological analysis it is manifested in the prevalence of explanations of cultural change by resort to hypotheses involving diffusion and/or invasion/migration, a research strategy whose explanatory failure was revealed by Julian Steward and Leslie White in the 1940s and 1950s. These are not weaknesses limited to this book or these authors, and which, although they must be noted, should not be seen as seriously detracting from the value of Chapter 3. Chapter 4, which is an excellent introduction to the decipherment of the ancient cuneiform texts and the problems involved in this highly specialised field of study, and which was presumably written by Weitzman, could easily be put down as recommended reading for anyone wishing to gain a sound basic and general knowledge of the state of the discipline.

The remainder of the book, Chapters 5–9, is more directly concerned with Ebla. These chapters are generally very good, although, of course, it is always possible to offer some criticisms. The few worth noting are, again, the rather brief sketch of the excavation and recording system used, which could easily have been improved upon without adding to its length. This is a point of particular interest to the specialist, whether archaeologist or textual scholar, and it is the reviewer's firm conviction that the interested layman would benefit greatly from increased clarity in this area; it also seems rather odd that as a reference for further reading on the subject of the excavation and recording system developed by Kenyon, *Digging up Jericho* is given instead of *Beginning in archaeology*. It seems that Matthiae's background in art history (pp. 124, 126) has led him, and through him the authors of this book, to regard the evidence of artwork as the primary line of evidence useful in demonstrating the distinctively Syrian character of the culture revealed by the excavations at Tell Mardikh (p. 147); while the utility of artistic traditions for this purpose cannot be denied, this is neither the sole, nor, indeed, the most important and useful corpus of evidence for such cross-cultural comparative studies. Finally, without denying in any way the major importance of the Ebla texts, it does seem a great pity that this book, in its examination of the findings of the excavations directed by Matthiae, concentrates so heavily on Ebla in the period of the state archives. By its neglect of the rest of the discoveries made by Matthiae and his colleagues it distorts the picture of the history of the site which has been revealed by the excavations: Tell Mardikh would have been a site of major archaeological importance had the texts never been discovered, and the ancient name never been known. Indeed, it must be said that the information revealed about the later phases in the history of Ebla are as important, if somewhat less spectacular, for our understanding of the archaeology of inland Syria as those from the period of Ebla texts. A proper perspective on these points is particularly important in a book such as this, intended for the non-specialist reader.

These things having been said, these chapters form an excellent outline study of what has been revealed of Ebla in the period between *c.* 2400 and *c.* 2000 BC. The reviewer particularly enjoyed the romantic, impressionistic picture of the excavation in full swing, and of life in the field. Years of sweating in the heat and dust and living in conditions which are, of necessity, seldom as comfortable as those at Tell Mardikh tend to blunt one's appreciation of this side of archaeology until so pleasantly reminded of it.

Overall, the one major fault of the book is the lack of cross-references between the text and the numerous excellent plates, and also between the text and the chronological chart tucked away at the back of the book.

None of the criticisms voiced above must be allowed to obscure the fact that this is an excellent introductory text for the interested layman, not merely in relation to the study of the archaeological remains and texts from Ebla, but also for the archaeology and history of the Near East generally. In addition to the wealth of information provided in the text, the full notes provide those interested in further reading with details of a wide range of sources to which they may turn, and the balanced, sceptical viewpoint of the authors gives a sound critical basis on which the various academic contributions may be judged.

RUPERT CHAPMAN

MATTHIAE, Paolo. *Ebla: An empire rediscovered.* Translated by Christoper Holme. London, Hodder and Stoughton, 1980, 237 pp., illus. £12.95.

This is a welcome book, for a number of reasons, not least of which is that it is the first full summary in English of the results of more than 10 years work at Tell Mardikh, which will be a great blessing for those who have not yet fully mastered the Italian in which it was originally published. This brings us to the first point to be made about this book, which is that the main body of the text was, as the preface in forms us, 'completed in August 1977' (p. 9). For this reason, the preface of this edition, which provides a brief updating of the work on the textual and archaeological material, is particularly valuable. The reader's attention should be drawn, in particular, to the statement (p. 11) concerning the revised reading of the texts, which has now eliminated all references to Akkad, Sargon of Akkad, Dudiya of Assur and Byblos.

The critical assessment of this book may be most conveniently divided into two general headings: (1) form and presentation, and (2) content. The present review will begin by considering the form and presentation. The one aspect of this book which must strike the reader most immediately and forcefully is the complete lack of relation between the text, the figures, and the plates. There is no list of figures or plates, and the plates are not even numbered. There are no references in the text to any of the plates or figures; at several points, most notably in the discussion of the pottery, the figures, which, for the pottery, lack internal numbers, do not appear to correspond in content to what is discussed in the text (e.g. the juglet discussed on pp. 99–100 which only appears as a photograph on the back of the dust jacket of the book). It is difficult to understand such a lack of coherence in a book of such importance, particularly as the amount of work involved in providing it is really quite small. Indeed, it is difficult to understand why figures and plates which do not correspond to the discussion in the text and which are not referred to in the text have been included in the first place.

In this book there are no footnotes, quite rightly in such a 'popular' work. There is, however, a bibliography of works concerning Ebla. Quite inexplicably, this bibliography has not been arranged in any standard tabular form, but as if the works concerned formed sentences, which they do not, in consequence of which the bibliography is much less easy to use than it might otherwise have been.

Several points must be noted under the heading of content. Matthiae has adopted a 'new' research strategy, which is humanistic and art-historical in orientation, modelled on classical archaeology, and rejects an 'anthropological' approach as inappropriate for historical cultures (p. 5). The effects of this research strategy are evident throughout the book in the extent of the treatment given to certain classes of artefact which have traditionally been considered *objet d'art* by Western scholars (including monumental architecture), and in his use of terminology (his equation of culture, civilisation, and artistic/architectural tradition, alone, illustrates his success in avoiding an anthropological approach). While the reviewer does not share either Matthiae's attachment to an art-historical research strategy or his belief that anthropological analysis is only appropriate to prehistoric cultures, this does not mean that these views are not valid; however it must be pointed out that, contrary to Matthiae's assertion (p. 5), this is not a 'new approach' (indeed it goes back to Winkelmann-Daniel, 1967: 18), and it seems unlikely to gain many adherents in modern archaeology.

A second aspect of Matthiae's research strategy is his rejection of the diffusionist approach which would see inland Syrian culture as a provincial, peripheral, poor, and essentially unsuccessful imitation of the Mesopotamian original (pp. 5–6), in favour of a view of inland Syrian culture as independent of, although continually interacting with, Mesopotomian culture (p. 205). This view is expressed most clearly in Matthiae's development of a terminology which he uses for the culture-historic phases of the inland Syrian culture (Fig. 9), and is one with which the reviewer is in full agreement. Unfortunately, this does not mean that Matthiae has rejected a diffusionist approach to the archaeology of the ancient Near East, but rather that he regards inland Syria as a third *kulturkreis* to be added to Egypt and Mesopotamia. This view is reflected in his attempt to derive the religious architecture of Middle Bronze Age and later Palestine from the architectural tradition of Ebla (p. 201); the great mother-goddess, known as early as the Gravettian in Europe (Childe, 1962: 19, 38), and from a whole range of sites in the Near East prior to the foundation of Ebla (Edwards *et al.,* 1970: 274, 312–3, 357–8, 379–80, 554, 579–80), and the Medieval European concept of kingship (p. 228) from Ebla. None of these assertions can be accepted.

A third aspect of Matthiae's research strategy is his excavation and recording system, and the tactics he has adopted in the layout of his excavation. Nothing is directly stated on the topic of his excavation techniques and recording system, although it appears that he has adopted a scientific approach. As for his tactics, Matthiae has rejected completely the use of in-depth excavation in favour of broad horizontal exposures (pp. 51–2), a decision which has, in practice, resulted in a series of one-period area excavations unconnected by any empirical stratigraphic link. Here it is essential to point out that Matthiae's division of the history of the site into Mardikh I–VII (Fig. 9) is not a division into empirical stratigraphic phases and stages as is Kenyon's division of the stratigraphy

of Jericho (Kenyon 1981), but is a division of the history of the site into culture-historical phases, into which the architecture, dated by the associated artefacts has been placed. While this procedure is essential in relative dating, both within and between sites, two points must be made concerning its use at Ebla: (1) the phases so constructed must not be confused, either as concepts or, in practice, with empirical stratigraphic units (e.g. Kenyon's phases and stages – Kenyon, 1981: 3), and (2) because the areas excavated at Mardikh are, in essence, unconnected single-phase sites, and because for some of these periods (e.g. Mardikh I, II A) there is not, in fact, any excavated material the sequence of culture-historical phases at Ebla is, perforce, based on the stratigraphic sequence revealed by deep excavations on other sites, which indicates that Matthiae's claim that previous scholars treated the culture of inland Syria as homogeneous and unchanging (pp. 5–6, 225–6) are somewhat exaggerated.

Finally, in his discussion of the rise of cities in north Syria, Matthiae appears to accept pure environmental determinism, and states that: 'It is difficult to explain the distance, not at all insignificant, of the Ebla site from the Madkh region' (p. 219). It would be even more difficult to explain the presence of a major international trading centre well away from any major international trade routes.

The detailed, and generally very thorough, discussion of the architecture of periods II B 1–2 and III A–B is very welcome. Several points are of particular interest; notably, the fact that although there is a sharp break in the pottery tradition between II B 2 and III A, there does not appear to have been a break in the occupation of the site (p. 112) and that there was a great deal of continuity between the city-plans of period II B 2 and III A–B, including the continuity of form and function of buildings on the same spot (p. 114), particularly in the case of temple D of period III (pp. 106–7). The discussion of the private houses (pp. 123–5), and sanctuary B 2 would be much easier to follow if they were related to the plans, and in the case of sanctuary B 2, if the reconstruction of the entrance were indicated on the plan. The fact that a discussion (too brief!) of the south-west gate as military architecture is postponed until near the end of the book (p. 204) rather than forming part of the excellent main discussion of this gate, detracts from the latter. The blockage of the staircase leading from the courtyard to the outer gate tower might, alternatively, be due to a desire to remove what was clearly a weakness in the city defences. No details are given as to the reasons for interpreting building M as a fortress, rather than, for example, a storehouse whose contents were perishable. Concerning the temples at Mardikh and the 'migdal' temples of Palestine, the massive nature of the walls of these structures is *not* due to a 'search for solidarity' (p. 201), but to the fact that these were multi-storey structures which needed firm foundations to support the weight of the upper walls and the thrust of the roof. Matthiae suggests (p. 193) that royal palace G was not built as a single unit, but that it grew by accretion; it would have been interesting to see the evidence, presumably stratigraphic, for this, and phase plans showing the course of the development.

Matthiae's opening statement on the pottery of the period II B I at Tell Mardikh which has been recovered so far, which notes that the range of types contained in the assemblage is subject to bias due to the fact that the assemblage comes from a palace, is excellent. So, too, is his summary of the affinities of the Mardikh II B 1 pottery with that from other central inland Syrian sites, and the distinctions between this material and that from the upper Euphrates, coastal Syria, and Palestine (p. 104).

Some of Matthiae's references to material from Palestine are not altogether happy. His comparisons of the pottery of Mardikh III A to the pottery of Palestine in the Middle Bronze I period (*which* MB I?) is not entirely convincing. He appears to date the beginning of this period in Palestine to *c.* 1850 BC (p. 200), whereas most authorities on the subject would now place in at *c.* 2000 BC, contemporary with the beginning of Mardikh III A. He describes, in some detail, a temple on the Citadel at Amman, which appears to be the temple excavated at Amman international airport, and draws a parallel between the plan of the completely non-axial, non-symmetrical sanctuary B 2 and the 'Double Temple' at Hazor which has marked bilateral symmetry around a tripartite central axis (p. 202).

Fig. 20 is quite unsatisfactory for a number of reasons: (1) it is a schematic section, but is not labelled as such; (2) there is no scale, and the drawing is published at a scale so small that none of the lettering can be read. On Fig. 48, Hazor and Megiddo have been seriously misplaced.

In spite of these criticisms and reservations the final judgement on this book must be that it is an important contribution which will continue to be extremely useful for many years to come.

RUPERT CHAPMAN

References

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Kenyon, K. M.	1981	*Excavations at Jericho*, Vol. 3. *The Architecture and Stratigraphy of the Tell.* London: British School of Archaeology in Jerusalem.

FRENCH, David. *Roman roads and milestones of Asia Minor.* Fasc. I: *The Pilgrim's Road* (British Institute of Archaeology at Ankara, Monograph 3) (BAR Int. Ser. 105). Oxford, British Archaeological Reports, 1981. 129 pp., 65 pp. of Turkish translation, 11 maps. £10.00.

This work, the first in a series on the Roman roads of Asia Minor, deals with the Pilgrim's Road which ran diagonally across Turkey, from Constantinople to Antioch via Nicomedia, Nicaea, Ankara, Tyana and Tarsus. Special attention is given to the middle part of the road, between Nicomedia and Tarsus, and above all to the region west of Ankara. Here the author discovered a stretch of road on the ground, following a course quite different from what had previously been proposed, and was thereby led to make interesting and attractive new suggestions about the sites of two ancient cities, Juliopolis and Lagania-Anastasiopolis. There is also a full catalogue of milestones found along the road.

This is a valuable work, not least for the way in which it shows how many past conjectures about roads in Asia Minor have come to be taken as established facts. What the author calls *Starr's Principle,* that before discussing sites along a Roman road one must locate the road itself, is of vital importance; the converse approach used in the past is bound to lead to errors, as it did among students of Roman Britain in the 18th century. However, the words of Starr himself (quoted on p. 35) seem a little extreme, implying as they do that cities can be treated as if they were geometrical points on a line. In practice, settlements and roads need to be studied together, and neither can be set aside in favour of the other. Thus one good way of checking the hypothesis 'Juliopolis=Eskişehir' would be to excavate at Eskişehir and find out whether it really does have the importance appropriate to a *civitas* rather than a mere *vicus* or *mansio.*

The book contains 11 maps of which the first (on a larger scale than the others, showing the region of Juliopolis and Lagania) is the most effective in illustrating the text. Map 2 is a useful general overview (though it should have been made clear that Eskişehir' and 'Sarılar Köprü' are the same place). Maps 8–11, interesting and somewhat startling, show proposed amendments to two earlier maps (Calder and Bean, 1958, Held, 1977). Maps 3–7, the most important of all, show the course of the road against a modern background; they are somewhat marred by the coarse appearance of the red overprinting and the excessive size of the symbols used.

It is very refreshing to see attention being given to the interior of Asia Minor; for a long time this region has been kept in the background, almost out of sight, by the spectacular remains to be found on or near the coast. I look forward to seeing many further fascicules in the series.

NIGEL SITWELL

BLANTON, Richard E. *et al. Ancient Mesoamerica: a comparison of change in three regions* (New Studies in Archaeology). Cambridge, Cambridge University Press 1982. x + 300 pp., illus. £17.50; £5.95 paperback

Both in its aims and methodology this book lies within the mainstream of the new archaeology which aspires the status of a social science and draws on the techniques of the physical sciences to this end. The authors are explicit in their goal 'to contribute to a better understanding of human behaviour and cultural evolution' and equally explicit in their disavowal of past attempts to explain the processes of change in terms of diffusion or by the methods of culture history: 'the study of (the) traditions, beliefs and customs . . . and how these cultures fare over time', while accepting that much of what is known about Mesoamerica has in fact been contributed by scholars working within this tradition. For them a more promising theoretical approach to the understanding of human behaviour lies in the concept of cultural evolution and the brief first chapter of their book is devoted to developing this concept. Cultural evolution is not predetermined or unidirectional nor are unicausal theories of evolution satisfactory. Rather it has a cyclical aspect, is opportunistic and notoriously resistant to explanation by the traditionally posited prime movers: technology, ecology, etc.' In explaining change in human societies one ought to deal with the 'core features' . . . namely scale, inte-

gration and complexity.' They propose to do so by applying a form of systems analysis involving the gamut of interactions among social institutions from the family up to regional government.

Recognising the magnitude of an attempt to tackle the development of precolumbian Mesoamerican civilisation as a whole, the authors confine themselves to the three areas about which we know most: the Valley of Oaxaca, the Valley of Mexico and the eastern (Maya) lowlands. The greater part of their book is devoted to a detailed interpretation of cultural development in these three areas from the early Formative to the late Postclassic largely on the basis of recent information: the data derived from the settlement pattern surveys which began over two decades ago in the Valley of Mexico. Not all of their data have yet been published and the present book is thus a pioneering effort into whose making an enormous amount of work has gone. It must command admiration and yet, for this reviewer, it also arouses some misgivings.

The empirical spirit in which the authors approach their task is repeatedly illustrated by their distaste for armchair speculation, their insistence that theory be solidly grounded in fact and the regret they express on occasion that their data are meagre compared to the complexity they seek to explain. As to substance, they begin each of the regional chapters with a solid account of ecological conditions and resources followed by an extended and circumstantial presentation of the ways in which they see society in the three areas as having evolved over approximately three millennia. They consider that these patterns of development have been somewhat different and advance opinions both as to the nature and reasons for these differences.

It would be impossible in a short review to do justice to the intricacies of the argument advanced and an illustration must suffice to give an indication of how far-reaching are their conclusions and, in consequence, of the serious scrutiny which they merit It is probably no distortion to say that their work has convinced them that, in Mesoamerica at least, population is not an independent variable and population pressure is not the cause of culture change as many others maintain. In each of the three areas, they assert, major changes in settlement pattern and power structure occurred while a wide margin of resources remained untapped and, even after the large population increases which ensued, it is not clear that significant population pressure ever developed. This conclusion, if accepted, will send many scholars back to the drawing board, the more so as Blanton and his colleagues seem not to have found a convincing alternative dynamic' of cultural change. Scale, integration and complexity, their core features, may usefully be explored as characteristics of social institutions – as principles of social organisation – but have no explanatory power at the level of culture development and, indeed, open the door to the re-entry of the population paradigm since they are conceived in terms of number and area.

In these regional chapters, the confidence with which the analyses and interpretation is presented inevitably varies with the volume of relevant data and the author's proximity to it. For the Valley of Oaxaca, where Blanton has directed the Settlement Pattern Project, the language is the most affirmative, though often couched in terms of hypotheses or propositions. At the other extreme, the eastern lowlands are described as 'poorly known . . . Far too often we lack the critical facts. But we shall try to keep the speculation to a minimum and then always in the form of research hypothesis. . . .' The flavour is probabilistic and this is clearly intentional. It permits the authors to build up a dense and consistent picture of how the three cultures may have developed without being confined to the demonstrably factual. This is stimulating and creative but poses one problem for the uninitiated: the detailed data on which the interpretations rest are not available within the book and there are thus no means of assessing their probability coefficients nor the margins of error to which statements of fact derived from these data may be exposed.

The book ends with a short chapter of conclusions and some generalisations about Mesoamerica as a whole. The authors rightly invoke lack of relevant data as a reason for our inability to understand and explain more fully culture development at this level. However, the preceding chapters do not give one much confidence that additional data alone will finally liberate us, as they would wish, from such old causal mechanisms as external threat, trade, environmental opportunity. Overall what impresses is the richness of content of this volume and the originality of its many insights. Much of it carries conviction; some of it startles by its unorthodoxy. It is perhaps best regarded less as an exercise in archaeology as science than as a trove of hypotheses to be tested as the new evidence becomes available.

J. C. LANGLEY

HAMMOND, Norman. *Ancient Maya civilization.* Cambridge, Cambridge University Press, 1982. xii + 337 pp., illus £22.00; £7.95 paperback.

It is arguable that despite the ample literature on the precolumbian Maya we have less certain knowledge of them and of their civilisation than of any native American group to whom comparable

attention has been paid. The beauty and grandeur of their ceremonial centres have been admired for nearly a century and a half and their intellectual achievements in mathematics, astronomy and calendrics have excited astonishment but we have known much less of their life and culture than we have, for example, of the Aztecs who like them confronted and were consumed by the Spanish conquest. The reason lies partly in the subsequent destruction of their literature, the paucity of ethnohistorical records, the inscrutability of their writing system and partly in the preoccupation of the eminent scholars who have dominated the field during the first half of this century with the intellectual life, calendrics and art of the Maya. This focus has changed dramatically during the past several decades and with it our understanding of Maya civilisation. This is the most obvious justification for this new addition by Norman Hammond to the literature and, as an eminent practitioner drawing on his own archaeological experience and other recent studies, he proves an entertaining and convincing guide to the new exegesis.

In a preface which disarms criticism, Hammond characterises his book as a survey for a non-academic audience of what is currently known of the civilisation of the ancient Maya; he also refers to its relative shortness and regrets the consequent 'sins of omission'. This is not entirely consistent but the incongruity turns out to be unimportant: the essential merit of the book lies in its full and carefully documented account of recent Maya studies which have drastically modified old views on the way the Maya lived and recorded their history. For those whose interests in filling out this framework is stimulated, there are comprehensive suggestions for further reading. Moreover, the book delivers a good deal more than the author promises in the sense that it makes accessible to its audience, academic as well as non-academic, the results of research, including Hammond's own work in Belize, which is otherwise largely confined to the learned journals.

The virtues of the writing – clarity, economy and a certain elegance – are exemplified in the first two chapters where Hammond introduces us to the Maya by retracing the steps of the early explorers, followed by the first archaeologists, whose colourful personalities and sometimes bizarre experiences provide an entertaining means of combining a good deal of background information with a brief history of Maya studies. The rest of the book deals with the new orientations which these studies have taken during the past quarter of a century and describes the ways in which these have changed our perceptions of Maya civilisation. By way of example, Hammond has found on the basis of excavations at Cuello, Belize, that people of Maya culture have dwelt in their homeland since at least 2500 BC, an extension into the past of about 1500 years compared to previous estimates. This calls for a re-evaluation of theories about the origins of Maya culture and its relationships with the formative cultures of its neighbours.

More fundamentally, the book reflects recent interest in the role of the physical environment and ecological factors in cultural development. One of the important puzzles of Maya history has been how the large populations involved sustained themselves on the basis of relatively unproductive swidden cultivation. An important insight of recent Maya studies has been the recognition that other productive forms of agriculture also existed. This in turn has provided the economic underpinning for new theories on Maya settlement patterns and social systems. The book deals clearly with new scientific techniques, such as those for determining the source of obsidian, clays and other materials, which are having a profound impact on our understanding of the role of trade in the growth and relationships of communities. It traces the way in which epigraphists have discredited the traditional view that Maya inscriptions dealt only with calendrical and astronomical matters, thus providing access to a wealth of historical data (albeit of limited scope) on the genealogies of the ruling families of centres such as Tikal and Palenque.

The sum of these new sources of information provides a very different picture from that until recently accepted of the Maya way of life, of its social, trading and political systems, of its art and finally of the Maya mind itself. This new picture and the way it has evolved form the theme for the latter chapters of Hammond's book. Much, as Hammond says himself, remains obscure and it is one of the merits of this book that it does not present speculation as fact but is content to point out the areas of our knowledge and ignorance and suggest lines for further investigations.

J. C. LANGLEY

HAMILTON, T. M. *Native American bows* (Missouri Archaeological Society special publication no. 5), 2nd edn. Colombia, Missouri Archaeological Society, 1982. xiii + 163 pp., illus. $10.00.

It is hardly surprising that T. M. Hamilton's important study of American Indian archery has been republished. Since the original publication of *Native American bows* in 1972 little additional information has appeared on this fascinating subject. Hamilton's work remains to this date an invaluable source of information on American Indian archery tackle and its use.

For those not familiar with *Native American bows* it is worthwhile to highlight some of the topics covered in this book. The introductory chapter deals with the various types of aboriginal bows and their classification. Basically Indian bows fall into three groups: self, reinforced, and composite bows. The remaining chapters discuss each one of these groups individually and present information relating to raw material, manufacture and use. Essential to the presentation are the numerous photographs and sketches which accompany the text. The personal accounts of the Indians who made and used these bows provide an interesting glimpse into a world which has long since passed into oblivion.

Those interested in making their own archery equipment will find the addition of Bill Holm's and Charles Grayson's work on horn bows most welcome. Holm provides a stimulating account of the manufacture of bows from mountain sheep horn and red deer antler. The expertise of both of these men contributes greatly to the original work. Since bows in these materials are today few in number the catalogue of 10 such bows in the United States National Museum provides data which are difficult to obtain. This catalogue appears at the back of the present volume as Appendix IV.

The second edition of *Native American bows* is published softbound by the Missouri Archaeological Society as part of a series of special publications In selecting Mr Hamilton's work for this series the Society could not ask for a more authoritative account of native American archery.

CHRISTOPHER BERGMAN

SHAW, J. C. *Northern Thai ceramics.* Kuala Lumpur, Oxford University Press, 1981. xiii + 270 pp., illus. £38 00

In the past the chief impediments to a fair assessment of Thai pottery have been either a total ignorance of ceramic technology or an excessive emphasis on Chinese influence, usually both. The author here however has exercised commendable caution and is clearly acquainted with the basic techniques. While paying tribute to the contribution made by Chinese technology to the northern Thai tradition, he has happily given due credit to the mobility of the cultural elements within the area with which he has been concerned and which had their own impact on the local industries. The history of Thailand during the earlier period of glazed ceramic production is very confused, and ethnic variety in production tends to take precedence over courtly patronage. It is these powerful local interests that introduce elements into the pottery which override Chinese influences almost whenever and wherever they fleetingly appear. With rare exceptions such as the massive jar with dragon handles (Pl. 114), believed to be of Sankampaeng origin, the forms of the vessels are distinctively different from those of China. And while a few of the decorations, especially on the Kalong material, reflects some Chinese influence most are treated with an elaboration of patterning that mirrors strongly local preferences.

The author's knowledge of the difficult terrain has made it possible for him to write with authority on the precise locations and constructions of the kilns, and the drawings of these and of the specific production of each group is a valuable contribution to our knowledge of the often extraordinary methods adopted by the potters. The great number of illustrations, some in colour, the reproduction of which is somewhat variable together with the line drawings in the text add much to the usefulness of this account. A useful glossary is included, in which it is interesting to note that the term 'pontil' finds a place and by implication is deplored, and yet it is used throughout the book. That a term from the glass industry should so long persist in this context indicates an intellectual lethargy that we could well do without.

One very curious observation occurs on p. 65 in connection with the brown ware of Payao, and must surely be a slip of the pen. It is suggested that 'some pieces may have been thrown without the aid of a wheel'; hand built is surely correct. On the matter of cobalt the author suggests that the Lanna potters either could not get it or that if they could it was too expensive. If we refer to the Chinese examples from Yünnan dating to the 14th century, included in *Kiln sites of ancient China* (London, 1980), nos. 317–319, and the cover illustration in colour, it would seem more likely that the real inhibiting factor was the inability to win the ore and purify it sufficiently well for it to be preferred to black. These quibbles apart it is good to have a text on this subject which is at last attracting informed notice. Cautious in his approach the author takes particular pains not to draw conclusions beyond the evidence, although his concluding chapter presenting alternative solutions to problems of form, style and dating are imaginatively and stimulatingly presented. It is to be hoped that this research so well begun will be continued.

MARGARET MEDLEY

RENFREW, Colin. *Towards an archaeology of mind: an inaugural lecture delivered before the University of Cambridge on 30 November 1982.* Cambridge, Cambridge University Press, 1982. 34 pp. 1 pls. £1.95.

Inaugural lectures are opportunities for consideration and discussion of major themes, often topical, often of great personal significance to the giver. Renfrew, returning to the hottest hotbed of British theoretical archaeology, clearly wishes to set out his views on the way archaeology should be directed in the next decade if not longer. His choice of topic is illuminating; his approach is not.

The title of the lecture implies some kind of 'keeping up with the Hodders', but the content reflects Renfew's quite different theoretical standpoint. For him the structuralist archaeology with its 'intuitive recognition of binary oppositions' holds no appeal and little promise. What is in its stead is less clear, despite the use of no less than 75 footnote references.

Renfrew is certainly not in the sociobiology camp, as a side-swipe at its major weaknesses makes clear, but the inaugural seems to struggle to find any format for studying the prehistoric mind. That the mind was used by prehistoric man is indicated (no great surprise there) and the concepts of cognitive mapping, religious ideology and deliberate design are introduced. But to what end? It is noteworthy that Renfrew's main interest seems to be with the very origins of thought, the very factors that made man different from other animals. Indeed, if an academic theme is to be recognised, it is this: we must deal with the very development of man, and therefore of his mind, both through space and (the archaeologists' prerogative) time: archaeology is about men, men are special because of mind, archaeology is about mind.

Palaeolithic archaeology is not Renfrew's field, and therefore one feels that most of the major developments in this area will not be made by him or his own students. It is, however, fair to expect Cambridge, the 'home base' of palaeolithic studies in Britain, to be taking part in this quest.

Can anything else be said of this inaugural? Yes. It is a fine political piece. Many people in Cambridge will like it: they are praised by name in it. Studies are, for example, 'vigorously continued', 'ably covered', 'energetically sustained'. What a happy hive of activity. But alas no archaeologist of the Americas. We must wish Renfrew well in his attempts to maintain and if possible expand archaeology at Cambridge. It is a pleasure to have had the benefit of its broad approach, and it is right that this should be safeguarded. Of the archaeology of mind; is the title more a symbol to gain group recognition rather than the main thrust of Renfrew's work in the next decade?

HAROLD MYTUM

BURLEIGH, Richard (ed). *Progress in scientific dating methods* (British Museum Occasional Paper No. 21). London, British Museum, 1980. 94 pp. illus. £3.75.

Do we need conference reports? The surest way to justify and thereby finance attendance at an international conference is to give a paper. That apart the only reward for the slog and effort of producing the paper is its publication. Hence a lot of published papers exist not because they needed to be written but because their authors needed to write them. Never have the editorial skills of balance, persuasion and the ability to say 'no' firmly been more necessary or so severely tried. If the volume is to be worth reading and thereby worth producing in the first place the sum of the contributions must be more than just an ill-digested record of the current state of individual research projects. They must combine a careful blend of review article, recent trends and speculation on the immediate and future implication of the work. So far the responsibility lies with the individual authors although the editor can make it pretty clear what he expects to receive. The choice and balance of articles within the volume requires care if the sum of the contributions is to fairly represent the field covered by the volume The editor must discourage ephemeral contributions and encourage more extensive reports of important developments.

Conference meetings which cover a wide range of very specialised and disparate topics such as the annual Archaeometry Symposium pose even more serious problems. Few readers could understand, let alone need to consult, more than a small percentage of the contributions outside their own speciality presented at such a meeting. After the British Museum Research Laboratory and the Institute of Archaeology hosted the 1979 symposium the editors tackled this problem by publishing four separate volumes to cover the main topics covered by the meeting which could form useful volumes. There was no attempt to publish all the contributions, topics which only produced a small number of papers were discarded and thermoluminescence research was already separately reported in Aitken and Mejdahl (1978). The chosen topics were *Scientific studies in numismatics* (ed. W. A. Oddy), *Early mining and extractive metallurgy* (ed. Paul Craddock), *Ceramics* (ed. M. J. Hughes), and the volume reviewed here.

The seven contributions which make up this volume combine to give the required balanced and authoritative account of the more important recent developments in physical dating. Radiocarbon dating has long held sway as the most reliable and widely used technique but other radioactive decay series are now being explored especially as a means of Pleistocene dating. There has also been a vigorous revival in archaeomagnetism studies following on a more thorough investigation of basic principles and more sophisticated apparatus.

The papers by Harmon and Hennig Bangert and Herr on the dating of speleotherm deal with the most successful application so far of uranium-series decay to Pleistocene dating in the range 5000–300 000 BP. Uranium and its decay product thorium have very different geochemical properties such that in the weathering of ground rocks thorium is easily fixed but uranium is transported in the ground waters and can eventually be deposited in speleotherm deposits, where the thorium can again build up in uranium by decay. Thus the uranium: thorium ratio is a measure of the age of the speleotherm. This method has already been used by Harmon *et al.* (1980) to date the archaeological cave deposits at Bilzingsleben in Germany, and the deposits in the Petralona cave, Greece, upon which lay the now famous skull (Hennig *et al.*, 1981).

In his paper on archaeomagnetic intensities, Walton gives a good discussion of the origins of archaeomagnetism, with a detailed discussion of the sources of measurement error and the precautions necessary to ensure accurate, reproducible measurements.

Research continues into radiocarbon dating of course. new methods of counting using much smaller samples, investigations on the factors limiting the ultimate precision of the method and the relation of the radiocarbon age to reality. The recent work on the counting of ^{14}C by high energy mass spectrometry at Rochester, New York (Beukens) and at Oxford (Hedges) is described in some detail, together with a specialist paper by White, Wand and Hedges on the most satisfactory method of producing the required ion beam. The University of Belfast Paleoecology Lab has long been investigating the ultimate precision of radiocarbon measurement, and are thus in an excellent position to judge how much the reported minor fluctuation in the ^{14}C calibration curves are founded in reality. Pilcher's paper shows that the wiggles in the curve are real, but that most ^{14}C measurements are not performed with sufficient accuracy to warrant their inclusion. The research at Belfast and elsewhere, such as that recently published by Francey and Farquhar (1982), shows that a great deal more research into the cause of the wiggles, and mechanism of carbon discrimination in plants is still needed before ^{14}C dating reaches optimum accuracy

Together the papers form a well-written and balanced description of current research and potential of new developments. This book is valuable reading for anyone interested in physical dating techniques and the influence they extend over our whole concept of the remote past. At £3.75, cheques payable to Trustees of the British Museum, it's a snip!

P. T. CRADDOCK

References

Aitken M. J. and Mejdhal, V. (eds)	1978	A specialist seminar on thermoluminescence dating (Oxford, July 1978), *PACT* 2 and 3.
Francey, R. J. and Farquhar, G. D.	1982	An explanation of $^{13}C/^{12}C$ variation in tree rings. *Nature*, **297**, 28–31.
Harmon, R. S., Glazek J. and Nowak, K.	1980	$^{230}Th/^{234}U$ dating of travertine from Bilzingsleben archaeological site. *Nature*, **284**: 132–5.
Hennig, G. J., Herr W., Weber, E. and Xirotiris N. I.	1981	ESR dating of fossil hominid cranium from Petralona cave, Greece. *Nature*, **292**: 533–6.

HODDER, I., ISAAC, G and HAMMOND, N. (eds.). *Pattern of the past. Studies in honour of David Clarke.* Cambridge, Cambridge University Press, 1981. ix + 443 pp., illus. £27.00.

This collection of essays in honour of one of the most influential British prehistorians reflects the profound effect David Clarke had on his colleagues and students. The essays range over a number of theoretical positions and deal with problems from all over the world. While this is stimulating, it does lead to some lack of coherence. This appears to have been recognised by one of the editors, Hodder, who offers an Introduction which attempts to set the essays in some sort of context. In this he is partially successful and as a result this review will concentrate on a brief critical comment on some of the essays whilst hardly more than mentioning others.

Ethnographic analogy has always been a difficult problem in archaeology: when is it appropriate, and how can any testing of such decisions be made? Dalton offers no help on the second matter but claims that there are no major classes of society that are extinct, and all previous societies can be roughly matched with ones that exist. Whether the Universities of Oxford and Cambridge would appreciate being used to illustrate the differences and similarities of New Guinea and North-west America respectively can be doubted!

Longacre and Hodder offer two contrasting views of the value and uses of ethnoarchaeology. Longacre is confident of its direct applicability to archaeology, using fieldwork from the Philippines. Hodder studies cultural patterning at the regional scale, looking at interactions between the Lozi and Mbunda of Zambia who have an economic symbiotic relationship. There are cultural identifiers for the tribes but these could only be recognised within the overall social context: a more pessimistic interpretation for archaeology. Fletcher uses cross-cultural material, including recent census data, to recognise consistent constraints on settlement sizes and densities for hunter-gatherers and small-scale agriculturalists, agricultural urban settlements, and industrial urban complexes.

A number of papers were concerned with the problems of the distorted archaeological record being correctly interpreted, with depositional and post-depositional factors, as well as differences in the concentration and nature of fieldwork being considered. Isaac examines the problem of palaeolithic settlement patterns in East Africa, and Groube identifies 'black holes' (genuine areas of non-activity at a certain period) in Wessex. It is, however, difficult to accept that black holes could be *more* important than the positive evidence. Economic, ecological and sociopolitical black holes can only be interpreted through the more eloquent surrounding areas of positive information. Hammond attempts to use evidence of distributions he considers reliable to simulate the spread of early agriculturalists across part of Europe. Amongst a range of conclusions drawn from eight different simulation models one particularly surprising conclusion was that even a population growth rate of 0.03 person per annum could have saturated the settlement area in only four centuries if there had been no migration. The matter of population pressure was also discussed by Wilkinson in relation to hunter-gatherers.

Sherratt suggests in his paper that one of the most important processes that took place in Europe was the 'secondary products revolution', by which the potential of products of living animals, and animal traction, was appreciated and brought into use. Whether this was indeed as sudden a change as Sherratt suggests, a case is well stated which emphasises the important implications of a continuing supply of food such as dairy products and the implications for agricultural trade of the use of animal power

Halstead is also concerned with agricultural production, suggesting that small-scale gardening was of great importance in Neolithic Greece, with a consequent lack of pressure on land and therefore no necessity for transhumance. In hunter-gatherer contexts, the importance of environmental change on the seasonal use is discussed by Parkington, with particular reference to a South African cave.

The social aspects of archaeological change are examined in the last three papers. Tilley compares systems theory and structural Marxism as providers of understanding for sociocultural change. In this he finds the former lacking, and puts forward a case for the greater use of the latter, giving as examples the transition from hunter-gatherers to agriculturalists, and the problems of European megalithic tombs Chapman, in a more obvious 'Clarkian' tradition, uses an old body of data, the grave goods and tombs of Los Millares, to suggest social organisation. Ellison carries out a similar exercise for the Middle Bronze Age of southern England, with the benefit here of far more, and often better quality, evidence. The inclusion of settlements allowed the possibility of integrating subsistence economy, exchange systems and social systems, a possibility not open to Chapman.

Overall, the volume contains a balanced selection, although whether many would find sufficient to make it worthwhile purchasing is doubtful. It should be well used in libraries, and indicates work both directly out of the Clarke stable and new developments which, if David Clarke had still been with us, he would have critically helped to foster.

HAROLD MYTUM

ORME, BRYONY. *Anthropology for archaeologists.* London, Duckworth, 1981. 300 pp., illus. £22.00; £7.95 paperback.

In Britain, in the early part of this century, archaeology and anthropology parted company, a divorce detrimental to both parties. Anthropologists adopted a synchronic framework, attempting to explain the functioning of societies with little reference to their past histories; archaeologists opted for a particularist approach and, by tailoring their explanations of change to the more self-evident classes of material remains, a techno-environmental orientation.

In recent years some renewal of contact (not enough to constitute re-marriage) has occurred, but there is some disagreement as to the level at which the links should be forged.

In the introduction to *Anthropology for archaeologists,* Bryony Orme discusses the various levels, from vague ethnographic parallel, through particular or generalised analogy, to a more radical theoretical link-up. Unfortunately this discussion is so condensed that for the novice it can only be confusing and for the initiate inadequate.

Once past the introduction it becomes clear that the book is primarily pitched at the level of comparative analogy. It is mainly about ethnographic variation and possible archaeological correlates, subsumed under chapter headings of 'Food and Raw Materials', 'Settlement', 'Social Organisation', 'Contact', 'Ritual and Religion' and 'Pastoralism'. In some chapters (particularly those on Food and Contact) there is an attempt to relate the ethnographic variation to a body of anthropological theory but it is not made sufficiently clear that this body of theory is as varied as the ethnographic data it attempts to explain.

It is a pity that these theoretical issues are fudged. None the less the book should be of value to archaeologists. It provides a necessary antidote to the usual techno-environmental pre-occupations, shows that economistic 'least cost' models are often rather irrelevant to social decision-making, and suggest, albeit rather sketchily, that social relations do leave their imprint on the archaeological record. The illustrations are often illuminating, particularly in the introduction, and the bibliography is very extensive. Indeed the bibliography might provide an admirable starting-point for an enquiry that moved beyond ethnographic analogy to the more important but much more difficult question of appropriate anthropological theory.

BARBARA BENDER

INGERSOLL, Daniel, YELLEN, John, E. and MACDONALD, William (eds.). *Experimental archaeology.* New York, Columbia University Press, 1977. xviii + 423 pp., illus. $31.25.

The editors of this informative collection entitled *Experimental Archaeology,* in selecting the 18 articles which comprise the book, have not restricted the meaning of 'experimental archaeology' to replicative experiments alone; they have applied the term to the entire spectrum of archaeological inquiry from the collecting of data to their subsequent description, interpretation and explanation.

Part one deals with what most of us associate with the term 'experimental archaeology', replicative studies. Among the papers presented in this section is one on stone tool function by the late Don Crabtree. Investigating the use of stone artefacts like 'polyhedral' cores, he shows that they may have served a purpose which has been previously overlooked. In his contribution, Dennis Puleston eliminates, by a series of simple tests, several suggested functions for a Mayan chultun or underground chamber cut into rock. In one instance he poured 400 gallons of water into a chultun to examine its potential capability for water storage. Within eight hours the water had completely drained into the surrounding porous limestone.

The second part addresses itself to 'testing the validity of methodological assumptions by applying them to known data or known results'. John Guilday demonstrates in his article that one technique for calculating the amount of meat consumed at a site is misleading. Using documents from Fort Ligonier, he proves that counting bones is not sufficient for estimating meat consumption at the fort because much of it arrived already processed and boned.

Context and the study of factors involved in site formation are the themes of the next section. Peter Jewell and Geoffrey Dimbleby present interesting results from the first four years of their experimental earthwork. Precise controls are used to monitor the changes brought about by natural agencies to a ditch and bank. This approach to understanding the creation and destruction of a site is now playing an important role in Stone Age archaeology. Robert Ascher uses an example of change in an automobile junk jard to illustrate that sites are part of a process involving ordering, reordering and disordering. He rightly points out that even a 'ghost' town is never static but is subject to disorganisation by nature. John Chilcott and James Deetz show how a 'laboratory site' can be used to test excavation techniques and the ability to recover artefacts.

In the final section entitled 'Living Archaeology' John Yellen discusses cultural patterning in the !Kung Bushmen butchering practices. His study follows three different avenues of inquiry. First he carefully observed and then interviewed the !Kung to understand why certain techniques of butchering game were used. His next step consisted of presenting the !Kung with an antelope carcass to process and consume. The bones were collected to analyse how they were treated and what form the resultant pieces took. Finally, he mapped, recorded and studied campsites which had been abandoned. It is obvious how projects such as this one are of primary importance in interpreting events at certain archaeological sites, particularly prehistoric hunting camps and kill sites.

Although some of the papers presented in this volume have been previously published they have been brought together to illustrate the wide range of experiments being carried out in archaeology. This range extends from the replication of a technology to testing the means by which we collect and interpret our data. As such this book has something of interest for everyone involved in archaeology, experimental or not, and should provide the impetus for future research.

CHRISTOPHER BERGMAN

HUMPHREYS, S. C. and KING, Helen (eds.) *Mortality and immortality: the anthropology and archaeology of death. Proceedings of a meeting of the Research Seminar in Archaeology and Related Subjects held at the Institute of Archaeology, London University, in June 1980.* London, Academic Press, 1981. x + 346 pp., illus. £15.80.

This book is the latest in the prestigious series of publications of the Research Seminar in Archaeology and Related Subjects, which has resulted in such famous volumes as *The domestication and exploitation of plants and animals* and *Man, settlement and urbanism*; this particular seminar took place in June 1980 and publication has followed commendably quickly and to a high standard The book is subtitled 'The anthropology and archaeology of death'. an order which more straightforward archaeologists would do well to note.

There are seventeen papers and an introduction by S. C. Humphreys; the contributors are largely American and British, with others from France, Brazil and India. The emphasis throughout is on death in its social context, whether it be the shape of the village of the dead in Krahó belief or the characteristic fractures of the arm in fishing communities. Almost all the papers are case studies, with the exception of Theya Molleson on bones, Orton and Hodson on theoretical statistics and Humphreys on 'Death and Time'.

The first six papers are the archaeological ones, dealing mostly with methodology: Theya Molleson gives a useful but essentially summary account of the usefulness of bone studies, while R. J. Berry does the same for the more specialised field of genetics. The skeletal biology of the classic Sudanese burials is expounded at interesting length, showing how complex models of the society can be erected on seeminly dry data, by G. Armelagos *et al.* There is a relatively old-fashioned archaeological paper on Franchthi Cave by T. Jacobsen and T. Cullen, while the Institute team of Orton and Hodson cast statistical doubt on the methods used in determining class status from grave goods. Finally Philip Rahtz, without any particular interpretational axe to grind, takes us through the data sources that should and will be used by archaeologists investigating post-medieval Christian burial.

The last 10 papers are more mainstream anthropology and correspondingly less comprehensible to this reviewer, who must admit to a sinking feeling when faced with peoples whose names include inverted commas (''Aré 'Aré') or pages filled with italicised words (*tapa yapu, moka*) and frequent illustrative stories ('on the 5th [day] Pendena gave the *kioti* proper'). Suffice it to say that there are studies of Madagascar (Bloch), Cameroon (Barley), Brazil (Da Cunha), Melanesia (De Coppet, Strathern), Kilimanjaro (Moore) and England 1500–1750 (Macfarlane), all dealing with attitudes towards death and the dead. They will be of interest to those who are able to relate them to their own studies. This reviewer was unable to do so.

The remaining contributions are principally useful in an interdisciplinary way, introducing archaeologists to fields of which they may have been unaware. Cassin deals with death in myth, while Vernant and Humphreys deal mainly with evidence for attitudes towards death in written sources, notably Greek. Humphreys dealing especially acutely with the relationship between death and time. Lastly Romila Thapar introduces the 'hero-stones' found in India in the first and second millennia AD, which resemble a cross between Pictish stones and gravestones of 18th century England.

As with any conference publication, the over-riding question will be whether the book is of even quality and whether it really covers its avowed subject. To take the latter first, there are too many areas ignored for this to be seen as a textbook on death; it attempts to cover a vast area and overstresses the anthropological side; yet it does also cover conventional prehistoric archaeology (Franchthi), skeletal biology. methodology. modern Christianity, literary evidence and Indian gravestones. The majority of the papers are contributions to academic discussion, not statements to a new audience, and so may be obscure to those who come to it afresh. The writing overall is reasonable and the academic standard respectable, perhaps the most memorable to one not enamoured of anthropology are the contributions of Armelagos *et al.*, Humphreys and Thaper. But the problem remains that this is a well-printed and bound book, with a high price and a fine-sounding title, yet it is not a textbook or a reference book, so was the effort expended on the production well spent? One understands the reluctance of organisers to offer a set of bound typescripts published by BAR but this volume errs in the opposite direction by promising more than it can deliver.

How does this volume compare with CUP's *The archaeology of death?* By its very size and diversity the former must be more useful, but one would not recommend either as a full introduction to the study of death. But one would not wish to end without pointing out that the present volume is consistently readable, pleasant to use and contains papers of interdisciplinary interest which one would be foolish to ignore. S. P. Q. RAHTZ

DEAN, Jeff. *Architectural photography: techniques for architects, preservationists, historians, photographers and urban planners.* Nashville, American Association for State and Local History, 1981. 132 pp., illus. $19.00.

Architectural photography, like archaeological photography, or like any other sort of technical recording, should be primarily an illustrative craft. It should convey a maximum of clear information without the photographer's personality coming between the viewer and the artefact. Sometimes of course a picture may be pleasing, or even beautiful in its own right. This is a bonus, and the mark of a good photographer but there is always a danger of the aesthetics of the picture becoming more important than the record of the structure. When a flight of steps is seen first as a linear pattern or a ruined tower as a setting for Gothic mystery, it may be good art (though usually it's nothing of the sort) but almost always it is a poor record. This rush to art seems to be an occupational hazard of architectural photographers, and books on the subject fall into two groups: the largely technical and the mostly artistic.

This book is firmly in the first camp. It is addressed to architectural historians and to non-professional photographers, and assumes the use of modest equipment. Unfortunately it is also addressed to an American audience, so the lists of suppliers and organisations, and the specifications for photographs for various historical and archive-collecting bodies are of little value. There is virtually nothing about dark-room work – a serious omission – and the style is a little irritating for a text-book ('The sun shone brilliantly on that crisp autumn day as Jill and I loaded the view-camera . . .' etc.). But most of it is a clear straight-forward account of a straight-forward job. P. G. DORRELL

ŽIVANOVIĆ, Srboljub. *Ancient diseases: the elements of palaeopathology.* Translated by Lovett R. Edwards. London, Methueh, 1982. xxii + 288 pp., 60 pls., 9 figs. £17.50.

Dr Živanović, Senior Lecturer in Anatomy at St Bartholomew's Hospital Anatomy Department, is an anthropologist with specific interests in palaeopathology. He has had many years of experience in fieldwork, particularly in Central Europe.

This book provides an extensive introduction to the variety of material encountered, methods of analysis, and then deals systematically with pathological processes and their effects.

An attempt has been made to keep medical terminology within the scope of the general reader, and there is a useful glossary of technical terms. There are exceptions: 'angulus colo-disphyseos' (p. 42) is a very archaeic term for the angle of the femoral neck.

This book has been translated from the Serbian language, and this has resulted in some curious and sometimes misleading use of the words. Thus the term 'junction' of the epiphyses is used to denote fusion with diaphysis (p. 45). Carpal bones 'grow together' (ossify). We read that 'the talus ossifies at 10 years of age and its various parts are united completely only at the time of puberty' (p. 45), yet in the previous sentence it is noted that the talus has a centre of ossification at birth. Since these bones transmit total body weight they must have a firm bony structure early in life. A compression fracture is referred to as a 'compressed' fracture (p. 130). The term 'impacted' as applied to fractures is used somewhat loosely, and can hardly apply to plate 42, where overlap is evident.

The section on 'Osteomyelitis after injury to the bone' (p. 176) is confusing. There appears to be a general inference that osteomyelitis is usually sequential upon major trauma. The illustration of an affected tibia in plate 50 is typical of what one might expect from a blood-borne infection: antibiotics have largely banished this picture from Western society, but it is still commonly seen in developing countries, particularly where there are predisposing factors such as sickle-cell anaemia and malnutrition, and it may affect more than one bone.

This work deals comprehensively with residual evidence of disease, both congenital and acquired. There are sections on avitaminosis, endocrine disorders, primary and secondary neoplasms, arthritis and infection. Dietary and environmental effects have been elucidated. One chapter is devoted to disease of the teeth and jaws. There are interesting chapters on artificial deformation of the skull, and trepanning. The text is profusely illustrated throughout the clinical sections. Based as it is on a wealth of personal experience, this book has a great deal of useful information which will be welcomed by those involved in the examination of the skeletal material from archaeological sites.

J. L. WILKINSON

BROTHWELL, Don and DIMBLEBY, Geoffrey (eds.). *Environmental aspects of coasts and islands* (Symposia of the Association for Environmental Archaeology 1) (BAR Int. Ser. 94). Oxford, British Archaeological Reports 1981. 206 pp., illus. £8.00.

This volume resulted from the first symposium held by the then newly founded Association for Environmental Archaeology. The membership of the association comprises professional specialists in a wide range of environmental aspects of archaeology and this collection of 13 papers reflects some of the special interests of the association's members. All papers reflect the general theme of the title, but a wide variety of environmental topics are covered, including landscape change (Bintliff; Gilbertson), diatoms (Jansma), vegetational history (Dimbleby *et al.*), mammalian fauna (Grigson), fish resources (Wilkinson) and even seaweed (Bell).

It is encouraging that although the Association is British based, its interests are far from parochial. The volume justifies its inclusion in the BAR International Series by including papers on landscape change in the Aegean coastal plains (Bintliff), the interpretation of dune stability in an area of south-eastern Australia (Gilbertson) adaptation to the desert coastal environment of Peru (Pickersgill and Smith) and diatom analysis from coastal sites in the Netherlands (Jansma).

Although the discussion in many papers is addressed to particular geographic areas, two papers particularly are broader in scope. Thomas's discussion of coastal resources is wide ranging and includes many interesting examples of the influence of climate and long and short term environmental change on the availability and therefore the exploitation of the resources and the location of settlements. Wilkinson's paper on fish resources also shows the importance of climatic change and suggests ways in which human subsistence strategies may have adapted to change in the availability of food resources.

The paper by Pickersgill and Smith on the desert coastal region of Peru, although limited to a discussion of a restricted geographical area, is particularly stimulating and covers a wide range of environmental issues which are well integrated with the archaeological evidence for the region.

Although some of the papers may seem rather impenetrable to those whose scientific background is limited, in fact the majority are very readable and well illustrated. Thus the book is of interest both to non-specialists and to specialists whose focus on one particular aspect of environmental archaeology occasionally leads to a regrettable ignorance of the development and implications of the work of colleagues in other fields.

There are inevitably dangers in forming an association whose membership is limited to those whose interests define them as environmental archaeologists, the main one being that such a separatist movement may have the result of further widening the gap between the more traditional archaeologists and the so-called specialists. What is needed in archaeology, if we are to make full use of the enormous increase in the amount and scope of information available from excavation and scientific analysis, is more integration of all aspects of archaeological investigation. It is hoped that this volume, and others to come in the same series may show the range of information now available and the relevance that the in-depth studies of what have been seen by some archaeologists to be peripheral issues have to the broader issues. Only by 'evaluating the relationship between the natural environment and Man himself' (Brothwell and Dimbleby, p. 1) can the real developments and achievements of man's cultural history be assessed.

ANNIE GRANT

BOOKS RECEIVED

The following books have been received. The fact that they are listed here does not preclude their review in a later issue.

AL-ANSARY, A. R. *Qaryat al-Fau: a portrait of pre-Islamic civilisation in Saudi Arabia.* Riyadh, University of Riyadh; London, Croom Helm, 1982. 147 pp. + 57 in Arabic numerals, illus. £14.75.

ALLCHIN, Bridget and Raymond. *The rise of civilization in India and Pakistan.* Cambridge, Cambridge University Press, 1982. xiv + 379 pp., illus. £25.00, paperback £8.95.

ARNOLD, C. J. *The Anglo-Saxon cemeteries of the Isle of Wight.* London, British Museum Publications, 1982. 127 pp., 76 figs., 9 pls. £35.00.

BAILEY, Geoff (ed.) *Hunter-gatherer economy in prehistory: a European perspective.* (New Directions in Archaeology). Cambridge, Cambridge University Press, 1983. viii + 247 pp., illus. £25.00.

BARKER, Philip. *Techniques in archaeological excavation,* new edn. London, Batsford, 1982. 285 pp., 86 pls. £7.95.

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